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Listerian Oration.¹

CHANGES IN THE LUNGS IN VARIOUS INDUSTRIES.

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Sydney.

I AM deeply grateful to your Branch for the honour it has done me in inviting me to deliver the annual Listerian Oration. It is unusual, if not unique, for a radiologist to be asked to deliver an oration of this nature; but when the question is considered it must be admitted that the true and useful radiologist is, after all, a physician who is specially skilled in the practice of that sub-branch of medicine, radiology. Essentially, a radiologist should be a clinician, and the wider his knowledge of medicine, the greater his value as a radiologist. The Royal Australian College of Physicians also looks upon the radiologist as a physician, and at its inauguration invited several radiologists (including myself) to become foundation Fellows.

The tendency of the medical profession to look upon the radiologist as a photographer is very difficult to eradicate; but if the general body of the profession looked upon the X-ray examination as a radiological consultation, it would mean improved results from this clinical method. The Faculty of Radiology (Great Britain) is doing good work in furthering this view. This Faculty now enjoys a prestige almost equal to that of the Royal Colleges of Physicians and Surgeons. The modern tendency to pass to a specialty after recent graduation does not produce the best radiologist; an apprenticeship in general medicine is absolutely essential. Any intelligent layman or laywoman can be

taught in a few weeks to handle switches and set meters and can produce excellent skiagrams; but to become moderately expert in radiological interpretation means the work of a lifetime for a trained medical graduate. A knowledge of radiography can be bought, but the wisdom of radiology comes only with the years.

The production of moderately cheap apparatus of low capacity has been capitalized by the X-ray manufacturers; but the scope of this apparatus is very limited. Fracture work and radiology in acute conditions of the chest may be handled by such small units; but the purchaser of these is deluded when he listens to the sales talk of the seller, and is apt to undertake work which is beyond the capacity of his apparatus and certainly beyond his ability to interpret its results. Although I have been intensively engaged in the practice of radiology for over thirty years, I am still sadly aware of my limitations in this field of medicine.

The great Lord Lister, whose memory we perpetuate tonight, was a real man of medicine, particularly versed in the procedure of surgery. Like all men who are really interested in the healing art, his first thoughts were always for his patient and not for material gain. Modern practice with its bursaries tends to produce medical men whose first consideration is monetary gain, as opposed to those members of the older generation who became doctors because they loved the profession and hoped to bring relief to the sufferer, and who loved the thought that they were bringing help to their less fortunate fellow beings. Lister, to judge from the various published accounts of his life, was a model of thoughtful efficiency, and in spite of opposition and disbelief, he lived to see his wonderful work in the field of antiseptics perform miracles for the sick and suffering, and to see its natural complement, asepsis, adopted in every country of the world. Just as the rising tide affects the main stream, its influence is felt also in every tributary of that stream; and so the discovery of the efficiency of antiseptics was felt in every branch of medicine and

¹ Delivered at a meeting of the South Australian Branch of the British Medical Association on May 29, 1941.

surgery. Very few originators of such innovations have seen such a consummation of their ideas during their lifetime.

My early days in medicine were governed by a mixture of antiseptics and asepais. Asepsis had become the practice of the operating theatre, while antiseptics was the practice in the casualty room. In the casualty room carbolic acid and the coal tar derivatives were in constant use. In 1907 and 1908 at the Sydney Hospital every open wound was swabbed out with pure carbolic acid and then with methylated spirits. The results were excellent and recovery was rapid. I often wonder whether the more elaborate modern multicoloured applications give better results.

The years between Lister and Röntgen were taken up with the perfection of antiseptics, and later asepais, which were occupying the attention of the medical world. When Röntgen's great discovery was made known, it was found that the medical profession was more receptive to the newer ideas. In Lister's days disbelief in anything novel was general, while when Röntgen announced his discovery it was admitted that any miracle was possible and could be accepted with various reservations in regard to proof. Thus again the influence of Lister was felt in the more rapid adoption of the Röntgen discovery than was the case in the practice of antiseptics. The general attitude of the medical profession in refusing to be stampeded by fantastic claims, although assailed by the lay Press, has reacted to the great advantage of the sick.

Röntgen made his great discovery on November 8, 1895, but did not publish it until the following month. Dr. A. S. Shuster published the first English report on the discovery in *The British Medical Journal* in January, 1896. Hundreds of investigators produced skiagrams within a few weeks of Röntgen's discovery, and in every city of the world one may meet with men who claim to have produced the first skiagram in that particular city. I have met dozens of men who produced the first skiagram in Sydney.

Numerous momentous discoveries followed Röntgen's original communication. J. J. Thomson discovered the electron; Becquerel propounded the theory of radioactivity; the Curies discovered radium; Rutherford demonstrated the possibility of splitting the atom; while in these latter days we have a bewildering number of men who are splitting everything and proving beyond reasonable doubt that lead may be turned to gold—the dream of the alchemists of old. These latter-day researches and discoveries are too bewildering to be dealt with in an address of this nature, and the unusual terms introduced in the course of these investigations would fill a dictionary.

When I commenced the practice of radiology in 1908 the apparatus was crude and its output was irregular. An induction coil with mechanical interrupter was in use, and the success of operation depended on the experience of the operator. The Snook interruptless transformer gave better output than the induction coil and was under better control; but the invention of the hot cathode tube by Coolidge in 1913 put the art on a scientific footing and allowed of accurate measurement of the electrical output by meters. The physicists and engineers then took control, and modern machines now give fixed outputs; and the production of good skiagrams is merely a matter of simple calculation, the only variable factor being the density of the patient.

At present there is a progressive increase in the price of apparatus. Manufacturers are constantly introducing unimportant improvements, and it is impossible for hospitals and radiologists to introduce these advances in their equipment. It is far better to have a good basic outfit and to give a little more time to the examination and put up with a little inconvenience than to install expensive apparatus for the occasional unusual position. "Shock-proofing" is essential in small hospitals and in bedside units, but it is not necessary in a large department with skilled technicians; yet "shock-proofing" alone has enormously raised the price of apparatus. In regard to many examinations, such as ventriculography, it is far

better to have a central specialized unit, such as exists at the Royal Prince Alfred Hospital, Sydney. It is the custom in that city to transfer patients from the other general hospitals to this central clinic, rather than to attempt to carry out the work less efficiently at each separate hospital.

It is not economical to install elaborate equipment for the occasional case, nor can the general radiologist give as good an opinion on a case as can the man who is constantly engaged on this special work within a specialty. It is interesting at this stage to refer to the first use of X rays in war. It is reported that the first X-ray unit used in warfare was in the campaign in the Egyptian Sudan in 1897-1898, when Lord Kitchener was shown skiagrams of foreign bodies and fractures. In 1900 the Australian forces had an X-ray unit in use in the Boer War. An outfit costing £100 (given by the late Mr. Sam Hordern, of Sydney) was taken to South Africa and was operated by a doctor named Edwards, of Sydney. Dr. Scot Skirving describes Edwards as being "decidedly eccentric and musical". Very little work was done with the machine, and it came to an untimely end by falling with its mule transport over a steep bank into the bed of the Orange River. The last Dr. Scot Skirving saw of the equipment from the top of the cliff was the four mules kicking a sad farewell as they lay on their backs near the stream.

In these latter days much has been heard of fluororadiography—that is, a photograph of the image as projected on the fluoroscopic screen. This is of value in the mass radiography of the chests of the general public. Later advances in technique will allow this method to be used in opaque meal examinations of the stomach and intestines. A small 35-millimetre film is used; but the image has to be enlarged by projection for examination by the radiologist. Another method is by the use of the five-inch by four-inch film, and this latter method shows practically every detail as seen on the 17-inch by 14-inch film. Cheapness is the first point in favour of fluororadiography; but unless large numbers of patients are examined the saving is not great. The 35-millimetre film allows of the detection of pulmonary lesions, and when an abnormal appearance is found the patient should be examined by means of the larger 17-inch by 14-inch film. After many experiments with the 35-millimetre film I am convinced that it is of little value in the routine investigation of silicosis. Progress skiagrams in known cases of tuberculosis should be made on the 17-inch by 14-inch films.

In the examination of the chest the ideal technique is one of high milliamperage with low kilovoltage. Excellent skiagrams can be made by the use of an exposure of one-twentieth of a second at a seven-foot distance with about 300 milliamperes at a pressure of 50 to 55 kilovolts. Higher milliamperages are destructive to tubes, and when milliamperages of over 600 are used the lung detail is soft and it is difficult to distinguish the normal from the abnormal. The use of the Potter-Bucky diaphragm in chest work is not to be recommended. Fluoroscopy is of little value in chest work except for the demonstration of effusions or for the localization of lesions previously demonstrated by the skiagram. Unnecessary fluoroscopy must be avoided if the radiologist wishes to enjoy a long life. Stereoröntgenograms should be taken as a routine in all chest cases; this means extra expense, but it is well worth it.

Now various changes occur in the lungs of workers in different industries; these changes occur so regularly and are so destructive that they must be considered as a hazard of the particular industry. In Australia the principal condition met with is silicosis due to the inhalation of dust containing silica. In Great Britain and the United States of America there are also numerous cases of disability due to inhalation of various fungi. Fungoid diseases occurring in farmers handling mouldy hay have been fully discussed by Richard Fawcitt in *The British Journal of Radiology* (March and June, 1936). The patients were harvesters; the fungi were isolated in all cases and belonged mainly to the phycomyces and

zygomycetes. A few cases of blastomycosis were met with by Fawcitt; but this condition appears to be more common in America. The sufferers complained of chronic cough and copious sputum, occasionally with hæmoptysis. Bronchitic signs were present and occasionally scattered consolidation was met with. Practically all the cases were considered to be due to tuberculosis until the sputum was examined.

It has been held that incapacity has been produced by the inhalation of various industrial gases—for example, hydrofluoric and hydrochloric acid, sulphur dioxide, phosphorus gases and gases of the acetone group; but investigation at the great Du Pont works (Evans) has failed to reveal any distinctive changes, and the rate of incidence of pulmonary lesions in these industries was found to be the same as that among the ordinary population. In Australia the yeast fungus and actinomycosis are at times responsible for disabling lung conditions. Other fungoid infections have seldom been reported. Yeast infection is associated with advanced dyspnoea and diminished air entry to the lungs. It is generally diagnosed as asthma. The film shows poor lung aeration with a general bilateral haziness. An exposure which should give a good X-ray photograph of a man the size of the affected person will show only a general haziness throughout both lungs. This result should always arouse suspicion when the worker is employed in the flour or baking industries.

Actinomycosis.

Actinomycosis is by no means uncommon. It may occur purely as a bronchial infection, the pus being confined to the bronchi, or it may occur as a pneumonic or pleuropneumonic condition. The latter forms are those usually met with. The condition occurs as a single lesion (unlike the blastomycotic infections), and is recognized as an area of irregular consolidation with evidence of infiltration of the surrounding lung. The consolidation contains scattered vesicular areas due to multiple abscess formation. Unlike lobar pneumonia, it will cross an interlobe or it will infiltrate the parietal pleura and the chest wall. In such cases redness and boggy oedema of the chest wall are present. The condition is almost invariably diagnosed as tuberculosis, as the symptoms and signs are similar. The ray fungus should be sought for in the sputum.

Asbestosis.

Asbestosis is uncommon in Australia, owing to the limited number of men engaged in the industry. It produces a pulmonary fibrosis of soft character with scattered areas of consolidation suggestive of bronchopneumonia. A search in the sputum will demonstrate the presence of peculiar bodies known as asbestos bodies. Asbestos is the only silicate which has been proved to produce pulmonary changes.

Siderosis.

Another condition described as occurring in hæmatite workers and electric arc welders is known as siderosis. I have had no experience of this condition. It is difficult to say whether it is a distinct entity or whether it is a silicosis modified by exposure to the hæmatite or finely divided iron particles which are given off in the welding or handling of the ore. Those affected are said to suffer from bronchitis with an irritating cough. Writers state that there is a "snowflake" mottling of the lung fields of soft character and symmetrical distribution. The onset is said to be after a few years' exposure to the dust.

Silicosis.

In our everyday life in Australia the main industrial pulmonary diseases are due to the inhalation of dusts containing silica. The industries concerned are rock-chopping, coal mining, cement and pottery work, tool grinding, iron moulding and sand blasting. In every case the degree of lung involvement depends on the amount of free silica contained in the dust; other contents of the dust are of minor importance. It was suggested by W. R. Jones (*The Journal of Hygiene*, Volume XXXIII, Number 3, 1933) that a substance called sericite was the

actual exciting cause of silicosis. Sericite is the hydrated silicate of aluminium and potassium, and has been found by Jones in quantity in the mineral residue of silicotic lungs. Other investigations have failed to support Jones's findings, and it is still the considered opinion of investigators that silica alone is the cause of the pulmonary changes. In some industries the hazard is great, and it is especially so in those industries in which the dust is extremely fine and in a state of great agitation and the worker is employed in a confined space. The risk of contracting silicosis is in direct proportion to the pure silica content of the dust. Some personal element also appears to be involved, as some men develop the disease after five to ten years of exposure, while others work for fifty years in the same environment, yet show no evidence of lung involvement nor any symptoms of disablement. Men with enlarged hilar shadows or with evidence of old pleurisy are more susceptible to disease than are men whose initial clinical examination reveals normal lungs.

The importance of the employment of none but healthy men in these hazardous works has been shown in the case of workers at Broken Hill. Since the work of the Industrial Commission at Broken Hill (1921) it has been the practice to employ men the skiagram of whose chest reveals no evidence of preexisting disease or of deficient lymph circulation. After sixteen years of this practice no new case of silicosis had occurred in the Broken Hill mines, where previously silicosis frequently had developed after fifteen years' exposure to dust and occasionally after eight years. The amount of change in the lung, as shown in skiagrams, bears no relationship to the physical disability. Advanced changes in the films may not be accompanied by any disability, while extremely early changes may be associated with advanced disability. The amount of silica contained in the various rocks and ores varies considerably. Sydney sandstone contains over 80% of free silica, while in ore mining generally the percentage is about 40. Coal contains from 3% to 5% of silica; but in most mines there are seams of sandstone which have to be cut through, and in these the silica content is high. Further, in many dusty mines there is a practice of blowing sand into the workings in order to carry coal dust to the floor and thus prevent the risk of explosion of a mixture of fine coal dust and air.

Anthracosis.

Anthracosis is a term that is used loosely in relation to two types of lesion—firstly, the blackening of the lungs of coal miners with an associated chronic bronchitis, and secondly, the fibrosis similar to that of silicosis found in sandstone miners. I think it would be better to refer to the first condition as anthracosis and to the second as anthraco-silicosis. Coal dust itself is apparently innocuous, and though it causes no distinctive changes in the X-ray film, it does cause a definite blackening of the lungs as seen *post mortem*. Coal dust is associated with small quantities of silica, which is in an extremely fine form, the grains being much smaller than 5 μ in diameter. Owing to the small quantity of silica present, the onset of the silicosis is much slower than is the case with Hawkesbury sandstone, of which the percentage of silica is in the eighties. In old coal miners it is common to find massive areas of subpleural consolidation, which occasionally undergoes cavitation. This lesion appears to be commoner in men who have worked in British mines. Lyle Cummings and Sladen agree that pronounced anthracosis without silicosis, as shown *post mortem*, causes little disability and it is really a progressive peribronchitic fibrosis, as opposed to the nodular fibrosis of silicosis. Pancoast and Pendergrass consider that coal dust is relatively inactive when compared with silica or asbestos.

The Method of Production of Nodular Fibrosis.

The method of production of the nodular fibrosis which is typical of silicosis has received great attention from various investigators. Many theories have been advanced; but it is now generally accepted that the silica particle has an irritative effect which tends to produce a localized fibrosis. The particles of silica dust which reach the

pulmonary alveoli are extremely small—from 5 μ to 15 μ in diameter. Larger particles are arrested in the trachea and larger bronchi and are expectorated. The microscopic dust, which becomes implanted in the alveoli, causes cell proliferation; these cells become phagocytic to dust and enter the lymphatics and are carried to the nearest lymph node of the lung lobule, where some remain. Local stasis at various sites leads to the formation of a pseudo-tubercle following tissue reaction. The activity of fibroblasts causes a surrounding fibrosis and hydrated colloidal silica is formed; this causes further tissue irritation and further fibrosis. As long as any free silica is present the fibrous tissue formation continues. The presence of an alkali accelerates this process. This is illustrated well by the extreme rapidity of onset of silicosis in workers who are engaged in the process of making sandsoap. At first the fibrous tubercles are microscopic in size; but when the fibrosis has proceeded for a considerable time the nodules become of sufficient size to throw a shadow on a good quality X-ray film. Before this stage of radiographically discernible fibrosis is reached there may be a general veiling of the lung fields, which is especially noticeable along the bronchial ramifications in the lower lobes; silicosis cannot be diagnosed from these appearances. There are no symptoms of disability at this stage. It is suggested that the presence of dust in a phagocyte may cause it to stagnate in the lymph stream, or possibly the overloading of the phagocyte may just cause it to "fall down on the job" and be unable to move at a normal rate. The foregoing points certainly explain all the phenomena associated with this condition of silicosis. The worker who is affected early may either be taking large quantities of silica dust into the lungs, owing to dry drilling or poor ventilation, or he may have some pre-existing pulmonary disease which has caused damage to his lymphatic circulation.

Men suffering from tuberculosis or chronic bronchitis develop silicosis more quickly than those with healthy lungs. It is an extremely difficult matter to state from the X-ray film when silicosis is present; but the X-ray film is the first positive evidence that silicosis is present. The fibrosis of recurrent bronchitis is generally of a streaky character, and it follows the lines of bronchial distribution. The silicotic changes are very gradual, and may take from eight to forty years to develop; they are frequently present in an advanced stage before there is any complaint of ill health.

The nodular fibrosis of silicosis generally occurs in the perihilar regions, with a preferential extension to the lung bases; this is especially noticeable on the right side. Its extension through the lungs is slow and the apices are generally affected last. At first there is a general increase in the shadows of the lung reticulum, with a regular arrangement of the fibrous nodules. Investigations of normal city workers should be made at every opportunity in order not to mistake the fibrosis of the middle-aged and bronchitic for the distinctive nodular changes of silicosis. It is urged strongly that the radiologist should refrain from interpreting the X-ray appearances as silicosis until nodular fibrosis is shown on the film. I am afraid that many radiologists are inclined to be swayed by the history of mining and to label a man as silicotic without sufficient objective signs on the film. The diagnosis of silicosis should not be made lightly, as once a man is told he has silicosis he becomes introspective and waits for those dread symptoms of "miner's disease" from which he has seen many of his seniors die.

Silicosis and Tuberculosis.

A well-established case of silicosis cannot be differentiated from miliary tuberculosis from the X-ray film alone. Clinical examination is necessary, and the presence of a rise in temperature usually points to tuberculosis; silicosis is unaccompanied by pyrexia. When areas of apical consolidation occur in the course of silicosis, it is generally a sign that superadded tuberculosis is present; and when tuberculosis is superadded to silicosis the outlook is grave. In my opinion all those cases which are described as acute silicosis are a mixture of silicosis and miliary

tuberculosis. I do not believe that there is any such entity as acute silicosis; the silicotic condition is essentially a chronic one.

The Progress of Silicosis.

Very little has appeared in the literature as to the time when silicosis can be shown radiographically or as to the progress of the disease once it has appeared. In a recent series of 300 men examined for the Silicosis Commission of New South Wales the times of onset showed a percentage occurrence as follows. These figures are of only slight value, as most of the men examined were either disabled or were seeking a percentage pension.

Under 5 years	3.0%
6 to 9 years	5.0%
10 to 14 years	5.0%
15 to 19 years	11.0%
20 years upwards	32.0%
Tuberculosis alone	11.0%
Silicosis with tuberculosis	8.3%
Clear after 5 years	14.0%
Clear after 20 years	10.7%
	100.0%

Of course, like all figures, these are deceptive. If a general survey of the whole mining population could be made, it would be found undoubtedly that the percentage of healthy men was very much higher. An important contribution is given by Dr. W. E. George, of the Broken Hill Technical Commission. He found that since only men with normal chests have been employed in the mines there has been no new case of silicosis among the workers after employment for a period of from eight to sixteen years.

Once silicosis is established the condition tends to progress. In a recent series of 100 subjects reexamined after a period of ten or twelve years there was found to be a continuous and rapid advance in the great majority of cases, as shown by the following figures:

Chest clear, with no change	22%
Tuberculosis without silicosis	2%
Definite advance in silicosis	44%
Clear ten years ago, but now definite silicosis	31%
Condition improved	1%
	100%

These figures are typical of those found in other series studied over twenty years, and coincide closely with those of other observers. In some cases the X-ray film appearances are at times rather surprising, when along with an advance in the disabling symptoms there is an apparent improvement in the skiagraphic appearances. The fibrosis apparently diminishes; but this is really due to advancing emphysema, which gives a greater translucency to the lungs. Emphysema itself is a difficult condition to be sure of in a skiagram. I consider it to be a lesion for the clinician in the early stages. Occasionally the horizontal appearance of the ribs and the appearance in the lateral skiagram of a translucent shadow between the cardiac shadow and the sternum is diagnostic. In advanced cases the apices are dome-shaped and there may be an associated kyphosis. When nodular fibrosis is present and the lung bases are clearing (especially when the progress is noted in skiagrams taken at intervals), it may be assumed that emphysema is also present. Many radiologists, with a certain abandon, regularly diagnose it; but I am afraid that it is only guesswork. The onset of tuberculosis is generally shown in the film by an increase in the markings in the first and second interspace on either side. The change may be accompanied by the finding of tubercle bacilli in the sputum. In coal miners the onset of tuberculosis may be suspected, but the appearance of tubercle bacilli is a late one, and even in advanced cases they may not be found. The failure to find tubercle bacilli in the examination of coal miners often leads pathologists to deny the presence of such a lesion; but it is generally accepted that the chronic type of tuberculosis that occurs in coal miners (probably influenced by the antituberculous nature of coal dust) is extremely difficult to demonstrate microscopically or histologically. This difficulty has led many

workers to consider the late apical cavitation occurring in silicosis as a silicotic process and not a tuberculous one.

Dr. George at Broken Hill, in the annual report of the New South Wales Workers' Compensation Commission of 1928-1929, reported on eight years' experience after the investigations of the Broken Hill Technical Commission of 1921, and this contribution proves the serious nature of silicosis. During the original investigation of the commission 6,538 miners were examined. Of 47 men classified as "Stage II" (that is, well-established fibrosis), 57.4% have since died of tuberculosis and 43.2% of other causes. Of a number of men stated to have had silicosis in Stages I and II, 47.5% have died of pulmonary tuberculosis and 41.2% of other causes. Of 101 men classified as suffering from silicosis and tuberculosis, only 15 were living after eight years. These figures certainly support the view that the occupation is an extremely hazardous one.

Discussion.

From this short and sketchy review of the incidence of disabling disease in industries where dust is present, it will be seen that a definite hazard exists. Every effort should be made by medical men and engineers to reduce this danger to a minimum. The use of respirators would probably completely overcome the hazards; but men will not work in them, as they find them extremely oppressive and inconvenient. Proper ventilation of mines is a great help in reducing the dust content, but the draughts produced bring complaints from the perspiring workers. Proper air conditioning will probably be applied to mines in time, but at present the expense is looked upon as being too heavy. Water vapour will precipitate a certain amount of dust, but the added dampness is very uncomfortable to the worker.

Lastly, let me refer to the question of compensation of individuals exposed to these serious industrial hazards. In New South Wales there is a special Workmen's Compensation (Silicosis) Committee, which considers the applications for compensation by these injured workers. When a man enters the industry he is examined, and if he is found to be suffering from silicosis or any other pulmonary condition or from advanced cardiac disease, he is not allowed to stay in the industry. If he becomes disabled in the industry he undergoes a medical examination and is then rated as having a percentage disability; he is either allowed to proceed at his work or is advised to leave it, and he is eligible for a percentage pension of his previous full wage. In practice it is found that the advance is only slight if the man continues in the industry, as the condition is already established and will continue whether the man remains in his dusty occupation or leaves it to follow another. One very important point in the New South Wales scheme is that there is a final medical authority. The members of the Medical Board are men with extensive experience in this class of work, and there is no appeal against the finding of this board. This board has been in existence for about sixteen years, and both employers and employees are very satisfied with the arrangement and are far from anxious for any change to be made. The expenses of this scheme are met by contributions from the men and from the employers, with an additional grant from consolidated revenue.

PULMONARY TUBERCULOSIS AND PREGNANCY.

By H. B. OXENHAM, M.B., Ch.M. (Sydney), L.M.R.C.P.I.,
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THE question of what effect pregnancy has on a woman suffering from pulmonary tuberculosis is one that has been hotly debated during recent years. It is a question the answer to which every medical man is sooner or later asked, and it is incumbent on him to have some knowledge of the subject.

There is a wealth of material for the student; in the early days of medicine both Hippocrates and Galen

advocated pregnancy as a treatment for pulmonary tuberculosis, and it is remarkable what a large number of good authorities of the present day maintain that during the actual pregnancy the tuberculous condition is not adversely affected and that the patient's general condition actually improves. This opinion was generally held among physicians till the nineteenth century, when Louis and later Ortega collected a series of cases which caused a complete reversal of opinion towards the view that every pregnancy in a tuberculous woman should be terminated.

This view, however, which was generally held for some ninety years, was not unchallenged. Forssner's careful work led him to believe that Hippocrates was nearer the truth. The work of Ornstein and Kovnat,⁽¹⁾ Castlen,⁽²⁾ Schultze-Rhonhof and Hansen⁽³⁾ indicates that pregnancy has little, if any, effect on the course of the disease and that the prognosis depends entirely on the type of pulmonary lesion.

During the last twenty years all extremes of divergent opinion have been advocated. De Lee makes the astounding assertion that "till it can be proved that pregnancy actually improves the tuberculous, early abortion in every case of active phthisis is the most charitable course". This is putting the cart before the horse with a vengeance; one might as well argue that till it can actually be proved that pregnancy never harms, but actually improves a woman's general health, no woman should be allowed to bear a child.

The burden of proof that pregnancy is harmful to the tuberculous certainly rests on the advocates of abortion before such a drastic step as abortion should be even remotely contemplated; and, further, they should be called on to prove that abortion is the least dangerous and best form of treatment. This they have conspicuously failed to do, in the opinion of the vast majority of experts in tuberculosis.

W. D. Brooks, in the issue of March, 1940, of *The Journal of the Royal Institute of Public Health and Hygiene*, states: "A close study of the literature yields some amazing facts, the most outstanding of which is that scarcely any accurate scientific data exist by which the hypothetical effect of pregnancy on pulmonary tuberculosis may be evaluated."

This point was discussed by Krause⁽⁴⁾ in the *American Review of Tuberculosis*; his words are worth quoting:

With few exceptions the usual and average study proceeds from fallacious premises, gratuitous assumptions and almost complete lack of definition and limitation of terms; and from so unstable a foundation it limps through a morass of slipshod data and the crudest handling of evidence to a palpably questionable conclusion. . . . Usually the author does not confine himself to pregnancy and its plain and probable influence on the mother. Only too often he lumps pregnancy, parturition and the puerperium and in so doing ascribes to pregnancy any and all the influences that are alleged to exert an effect on the coexisting tuberculosis.

After further remarks on the comparison of masses of figures without allowance for age, for social or economic environment, or for primiparous as compared with multiparous women, Krause goes on:

But greater than any other fallacy in the customary approach to the problem is the almost universal premise and assumption that pregnancy acts as a constant factor in whatever influence it may have on tuberculosis. That is to say that all women tolerate pregnancy alike.

Krause concludes that pregnancy exerts a harmful effect on pulmonary tuberculosis in women who, without tuberculosis, would naturally tolerate pregnancy poorly, and exerts a harmless or even beneficial effect on those tuberculous women who, without tuberculosis, would tolerate pregnancy well or even have their bodily economy improved by pregnancy.

Brooks, commenting in his paper on Krause's and other articles, makes the following statement:

If we are honest therefore with ourselves we must admit that we cannot today give a categorical answer to the general question: Has pregnancy an effect benign or malign upon the course of pulmonary tuberculosis in our patients?

In the matter of treatment the crucial question is whether the lesion is active or inactive. Brooks gives his opinion as follows:

Those with old arrested tuberculosis may proceed to term with reasonable safety, while under supervision through pregnancy and for at least one year after delivery. . . . In those patients with active tuberculosis almost every degree of activity is shown, and I have the conviction that no such case should be aborted on principle, particularly if she has a history of being manifestly improved since the onset of pregnancy. Especially is such conservatism worthy of consideration in the case of a tuberculous multipara who presents a history of abatement of phthisis during a previous pregnancy. In addition, though for a different reason, it is, I think, bad practice always to abort a patient with far advanced active pulmonary tuberculosis, since the majority will undergo spontaneous abortion with far less risk to themselves. Similarly, abortion after the fourth month is in any case undesirable, since it has been shown to incur as great a hazard to the patient in respect of activating tuberculosis as natural labour at term. There exists a group of cases who have active pulmonary tuberculosis in whom, for religious, medical or other reasons, abortion cannot be undertaken. For these patients adequate hospital and sanatorium therapy, both before and after delivery, is essential and the experience of Jennings, Mariette and Litzenberg would suggest that they do as well under such conditions as their similarly diseased non-pregnant sisters. Furthermore, evidence of the effectiveness of various forms of collapse therapy during pregnancy is steadily accumulating.

Brooks quotes eight workers who have obtained eminently satisfactory results from this treatment in 160 cases. He goes on:

There is reason to suppose, therefore, that, with expert management, the prognosis for patients in whom pulmonary tuberculosis and pregnancy coincide is by no means gloomy. Yet, despite the above, he stated:

There are many cases of active phthisis which are either pregnant for the first time or which give the history of tolerating pregnancy poorly. Abortion before the fourth month is probably for these the safest course for the majority, and it should be followed by active expert treatment of the tuberculosis in a hospital or sanatorium.

In view of his previous arguments, I am quite unable to follow Brooks's hesitating supposition that abortion is probably the safest treatment for the majority, especially for tuberculous *primiparae*, who are reputed to stand pregnancy well.

What is the expectation of life for a non-pregnant, non-parous woman found to be actively and clinically tuberculous? Many of them die within two years. Yet if a woman has been allowed to go to full term and dies within years afterwards, the tendency is to blame the pregnancy. Hence, many of us are afraid to take the responsibility of allowing the pregnancy to go to term for fear of future blame. "Certainly", says Krause,¹⁰ "it is anything but scientific to lay to pregnancy, in a woman who has tolerated pregnancy extremely well, an activation or aggravation of her tuberculosis which has followed an abnormal, exhausting or dangerous second stage of labour, as has frequently happened."

An exhausting second stage with inhalation anaesthesia—factors which can be avoided—may be in my opinion a frequent cause of aggravation of pulmonary tuberculosis. Furthermore, the puerperium should be prolonged and the patient made to rest in bed for at least one month, or, if tuberculous activity is likely, for a further period till the lesion is quiescent.

Skillen and Bogen, in *The Journal of the American Medical Association* of September 24, 1938, at page 1153, quote records concerning 10,000 admissions to Olive View Sanatorium, California:

Analysis of the stage of the disease in the single, childless and parous women showed little difference in the extent of the lesion on admission. The end results or case fatality rates gave similar figures. The figures include fifty pregnant women with active tuberculosis. Fourteen were allowed to be delivered, most of the others had a therapeutic abortion usually accompanied by sterilization. Only three cases had minimal tuberculosis—all alive when last heard of. Eleven had moderately advanced tuberculosis; of these, only one has since died (soon after abortion was performed).

Thirty-six had far advanced tuberculosis. Sixteen are known to have died, six after full term delivery and ten after abortion with an annual case fatality of 8% a year for those delivered at term and 7% for those whose pregnancy was aborted.

The mortality rate of those delivered at term is little higher than the rate of those whose pregnancy was aborted and neither rate seems higher than that of the general sanatorium population.

Responses received from patients discharged from Olive View indicate that more than fifty other patients became pregnant after leaving the institution and that most of them went on to term. The mortality rate in this group was extremely low. Only two of the patients are now known to be dead, and both were in the group of ten with far advanced tuberculosis when admitted.

It is obvious that these patients who responded might have been expected to have a better fate than the remainder.

Despite these negative statistics many of the 2,633 female patients as well as the physicians interviewing them, stated on admission that they traced the breakdown to the last pregnancy. Five per cent stated definitely that the onset of tuberculosis was observed in connection with pregnancy: during the course of pregnancy in twenty-six cases, after miscarriage in twenty-seven cases and after delivery in sixty-nine. It may be questioned, however, whether they were then expressing the prejudices or preconceptions of the patients or those of the examining physicians, often made known in an accompanying note. The greater attention may be a factor in revealing an otherwise overlooked condition.

The paper concludes as follows:

By and large, it seems that the tuberculous woman who becomes pregnant has a course not greatly different, so far as tuberculosis is concerned, than her tuberculous sister who does not become pregnant, while so far as her pregnancy is concerned she does not greatly differ from other women.

If a pregnant tuberculous woman has active disease she should have collapse therapy and rest treatment but so should she if she were not pregnant. A long and exhaustive labour should be avoided for tuberculous women by the use of obstetric analgesia and surgical intervention when indicated.

Dr. Emil Bogen, in discussing the above paper, made the following statements:

More than one-tenth of all the patients in whom tuberculosis is diagnosed die annually. Pregnancy gives no definite protection against this high mortality rate. . . . At present it can be said that in patients whose tuberculosis has been arrested and who are continuing under good medical care, the outlook for the children is very good. In cases with active tuberculosis and positive sputum there should be a prolonged separation for the child.

In view of the uncertainty which exists in regard to the wider aspects of the question, let us get down to facts, says Brooks. "Pregnancy is a normal female function. The difficulty of pregnancy and labour are increased in civilized communities. The condition of some women is improved by pregnancy, and subsequent pregnancies further improve their general health. Others bear pregnancy very badly. Between these extremes lie every variation."

"In England the vast majority of women develop pulmonary tuberculosis which heals without difficulty or any ostensible consequences; in fact, they never know they have been infected. A small proportion do not develop it. A small proportion develop it and succumb to it after a varying period of time, or carry with them varying permanent pathological sequelae. In some cases, latent, relatively quiescent or active pulmonary tuberculosis is promptly and without any doubt made worse by pregnancy, more especially a second or third pregnancy."

The last fact, according to Brooks, is that there are also women whose active pulmonary tuberculosis is definitely improved by pregnancy. This improvement is particularly likely to be noticed during the course of pregnancy. A proportion of such patients relapse during the puerperium, sometimes disastrously so; but in some instances the improvement is maintained and the pulmonary disease arrested.

The subject is dealt with in two articles by James Young and Henry Cohen and an editorial in *The British Medical Journal* of October 17, 1936. Young is professor of gynecology in the University of London. He quotes 36 cases of pregnancy complicated by pulmonary tuberculosis in which a follow-up was carried out for a year or more. He does not state at what stage of the disease any of these patients entered on the pregnancy, nor does

he attempt to give any estimate of their expectation of life apart from pregnancy, nor of the average duration of the follow-up. But in this unspecified time fourteen died, and eight died from a few days up to three and a half months after confinement. Of these eight, seven had had the disease from one to ten years and were therefore in a presumably advanced state.

Young stressed the dangers of abortion in his paper, stating that unless carried out with care and skill it might "seriously imperil the patient's chances". He advocates a basal anæsthetic with abdominal hysterotomy and sterilization of the patient at the same time. This prevents the woman, if later her condition is arrested, from ever having a child, though it may be reasonably safe for her to do so, according to Young himself. The sterilization is thus a totally unjustifiable procedure, and the fact that such a procedure as hysterotomy is advocated instead of abortion underlines in red ink the dangers of abortion as usually practised.

In any case, according to the Olive View Sanatorium and other statistics of Dr. Emil Bogen, more than 10% of all women in whom tuberculosis is diagnosed die annually, irrespective of pregnancy.

Another factor which must be considered, according to Dr. Bogen, is the fate of the child. In the past, the outlook for the children was extremely dismal. At present it can be said that if the patient's tuberculosis has been arrested and she is continuing under good medical care, the outlook for the children is very good. When the mother has active disease with tubercle bacilli in the sputum, separation of the child from the parent is generally advised, and such a woman should look forward to a long period apart from her child.

Henry Cohen, in opening a discussion on tuberculosis and pregnancy reported in the same issue of *The British Medical Journal*, states: "Although abortion was generally urged as a therapeutic procedure in the first two or three months of pregnancy, the available statistics throw considerable doubt on its efficiency in preventing the spread of the disease." He goes on to state that "advance in our knowledge of the inter-relationship of pregnancy and tuberculosis will not come from *ex cathedra* pronouncements of accepted authority, but from the careful collecting of apposite and adequate data and their subsequent unprejudiced analysis".

This is a statement on which all who have the truth at heart will agree, for the subject has been clouded by preconceived notions from the "I have always been taught" school, who have not inquired for themselves into the truth of or grounds for the teaching.

Dr. Cohen quotes Forssner's figures; 37% of 398 non-pregnant women with advanced tuberculosis died before the end of a year, as compared with 46% of 203 pregnant women. He also quotes Bridgeman and Norwood's notes of 14,000 maternity patients in Baltimore, of whom 1% were tuberculous—an incidence roughly corresponding to the morbidity rate in the whole population of Baltimore, and suggesting no gross increase in incidence due to pregnancy. There were 17 cases of definite but inactive pulmonary tuberculosis, 10 unilateral and 7 bilateral. Ten patients had been followed up from six to twelve years, and all were well. The remaining seven were well six months to five years after. Those with active tuberculosis numbered 31. About half of these died or were expected to die within a year after parturition. But Bridgeman and Norwood asks: "Was the mortality rate greater than that found in non-pregnant women with active tuberculosis in a similar age series at approximately the same stage of the disease?" They quote the cases of 72 non-pregnant women with active tuberculosis of whom at the end of the year 32% were dead, 24% "not improved". This does not leave a very large percentage that could be said to be adversely affected by pregnancy.

In discussing these two papers by Young and Cohen in an editorial in the same issue of *The British Medical Journal*, the editor estimates that there are 700 phthisical women in London who annually become pregnant. Yet he remarks on the astonishing fact that of 13,000 confinements in the London maternity hospitals, only some 20

or 30 are reported as complicated by phthisis. He notes the optimistic outlook of Dr. J. Gravesen, of Denmark, in whose sanatorium abortion is not practised at all, and whose results are good, and also the fact that at this joint meeting of the Sections of Tuberculosis and of Obstetrics and Gynecology at which the papers were read, those present "were unanimously and strongly of the view" that sanatorium treatment was the ideal.

Yet in the face of these figures and facts and of those commented on by Dr. Cohen, the writer of the editorial comes to the still more astonishing conclusion that "if active tuberculosis is present or has been present during the preceding three years, the uterus should be emptied according to Young's dictum, irrespective of the advice of the tuberculosis expert who may be looking after the patient". Such a conclusion is the most unwarrantable that I have ever seen in a responsible journal. The gynecologist, who in most cases knows nothing or next to nothing of the progress and treatment of tuberculosis, is to supersede the expert and become the sole administrator of treatment.

It is a remarkable fact that, in studying the literature on this subject, the gynecologists as a class tend to favour abortion as a treatment, apparently because they have seen tuberculous women die after pregnancy, forgetting or not knowing that a large proportion (estimated as high as 50% of all non-pregnant women with clinically active tuberculosis) die within two or three years, and according to the New South Wales Board of Health figures referred to later, 90% of all sanatorium patients die or are readmitted to sanatoria within five years.

On the other hand, specialists in tuberculosis unanimously condemn interference with pregnancy in clinically inactive cases; most of them are doubtful of the efficacy of abortion as a treatment, and many do not practise or countenance it at all—for example, Gravesen, of Denmark, perhaps the leading expert in tuberculosis in the world; his results with collapse therapy and sanatorium treatment have been so striking as to make many men who are acquainted with his work and their subject, change their views and review their methods of treatment.

This recent review of treatment is well illustrated in the United States of America. A huge, nation-wide scheme has been inaugurated against tuberculosis, and much excellent work has been done in connexion with tuberculosis associated with pregnancy. Charles R. Castlen, in the *American Review of Tuberculosis* of September, 1936, has a paper characteristic of modern opinion. He states that "one of the greatest influences against wild and uncontrolled birth control and abortion has been the medical profession. However, until the obsolete and erroneous teachings so generally accepted by the majority of our members are corrected as to the hazards of pregnancy in the tuberculous, we may expect no different understanding of this very important matter."

"If we pause for a moment to reflect upon the illustrious names on the long list of those geniuses who have been tuberculous, we can readily see that to deny the offspring of such mental giants the right to be born would indeed be short-sighted and unwise—especially so, since this denial would be founded on the dogmatic and outlived beliefs in the danger of pregnancy to the tuberculous. And since the offspring of these same sufferers from disease are born into the world as free from hereditary taint and with as good a promise of health as the children of more fortunate mothers, here is another reason against such a denial."

Many men have experimented with guinea-pigs and rabbits; their results tend to show that the tuberculous condition was not affected in the mother and that the offspring was unaffected.

Schultze, Rhonhof and Harsen, in a most exhaustive review of the subject in 1931, pointed out that animal experimentation had not solved the problem of tuberculosis in pregnancy.

More recently, in 1935, Ornstein and Kovnat, in the *American Review of Tuberculosis*, reviewed the problem in connexion with 5,470 tuberculous non-pregnant women and 85 tuberculous pregnant women; they showed that the

pregnant, apparently, had somewhat the better outcome. The death rate in the two groups was slightly lower among the pregnant.

Castlen quotes Weemburg Van Tussenbroek and Alice Hill as stating that they had gathered material from separate clinics, where they were able to compare pregnant tuberculous women with non-pregnant tuberculous, and they report that the tuberculous patients in the two groups had practically parallel courses. Their studies point to certain facts; first, that there is need for adequate treatment, and second, that with adequate treatment therapeutic abortion is rarely indicated.

Jennings and Mariette, in a biometric study of 470 tuberculous women, of whom 80 bore children, obtained much the same results; "those who have borne children and those who have never been pregnant are not differentiated in tuberculosis with respect to improvement and non-improvement in their condition."

Castlen illustrates his article with the records of four striking cases of pregnancy associated with advanced tuberculosis and various serious complications, in which the prognosis appeared hopeless. The patients were treated with collapse therapy and all recovered. Three of them had subsequent pregnancies without ill effects. All are leading normal lives, looking after their families, and the condition is arrested. Castlen concludes:

After a careful perusal of collected studies of qualified observers who have investigated this problem from various sides as to the type of the disease, stage, and end results, and with the author's own experience of long observation of many pregnant tuberculous patients, it is believed that the risk of pregnancy for a tuberculous woman is not greater, if she is properly treated, than for the non-tuberculous pregnant patient.

Therapeutic abortion is rarely, if ever, indicated in these patients and never after the fourth month.

With a better and more intelligent understanding of the problem, and with proper management, we shall see these young women emerge from an experience, once looked upon by most of us as most dangerous and unjustifiable, almost if not quite as safely and successfully as their more fortunate sisters.

Janne and Muir, in an article, "Prevention of Tuberculosis begins before Birth", in the *American Journal of Obstetrics and Gynecology*, September, 1939, review the results at Santa Clara County Hospital, where collapse therapy is used during pregnancy in suitable active cases. After giving their results, they end the paper thus: "This brings us to the conclusion that tuberculosis and pregnancy are not incompatible if tuberculosis is diagnosed early and collapse therapy can be instituted."

Dr. S. Payling Wright, writing in *The British Medical Journal* of November 22, 1940, states that "from a study of the vital statistics from 1931, it is possible to obtain comparative figures. Apart from a few exceptions, which are mostly in those classes which contain only a small number of married women, the mortality rates from respiratory tuberculosis among single women are higher than those found among the corresponding married women of this age group. The search for methods of overcoming the ravages of this disease may therefore continue along other and more hopeful lines than that of discouraging young women from exercising their natural maternal functions."

Cohen, Grant and Wilkinson, from the Braintree Sanatorium, where there is a maternity ward, writing in *The British Medical Journal* of December 21, 1940, in support of Wright, give the results of 39 maternity cases. Eleven patients had active and 28 quiescent disease; among the latter were 11 who had been admitted to the sanatorium with an artificial pneumothorax and one who had had a successful total thoracoplasty. No adverse effect of pregnancy, labour or puerperium was observed in any of the quiescent cases. In the 11 active cases evidence of retrogression occurred in three, in three the condition became quiescent and there was no change in five.

The 1939 "Annual Report of the Health Department for New South Wales", Section 1D, Tuberculosis Division, has some interesting figures concerning the incidence of tuberculosis in the State; these will bear careful study in connexion with this paper, especially with regard to the

sex incidence. The follow-up of the patients admitted to sanatoria is apparently very thorough. The notifications of pulmonary tuberculosis for the State were 1,687, and the deaths were 1,011. It is consoling to note that the death rate was 33.5 per 100,000, which was the lowest ever recorded in New South Wales. Graph number 18 shows that this death rate has fallen regularly, from 158 per 100,000 in 1885 to the present low figures of 33.5. The death rate had therefore fallen to one-fifth of that of 53 years before. An appended table showed that nearly 90% of those discharged from sanatoria were either dead or readmitted to sanatoria within five years; this illustrates the necessity for after-care and for proper provision for patients and their dependants during their stay in sanatoria or after their discharge.

Now one would certainly expect that, if it was a fact that pregnancy had such a dire effect on a tuberculous woman, both the incidence and death rate would be much higher in females than in males, especially the death rate. But what do these figures show in New South Wales? There were 1,003 males suffering from tuberculosis to 684 females—that is, 40.5% of notifications concerned females; 647 males died, compared with 364 females—that is, only 36% of those who died were females. Thus, both the apparent incidence was much less among females, and of those notified as suffering from the disease the percentage death rate among females was less even than the apparent incidence—this in spite of the alleged dire risks of pregnancy which most of the women presumably undergo. These figures of New South Wales only follow the same trend as all the figures of vital statistics analysed by other observers.

As regards expectation of life, in the mass of those admitted to sanatoria in New South Wales, the report gives the total deaths within five years of admission to the sanatoria in each of the institutions. Waterfall Sanatorium, where most of the severely ill patients are sent, as one would expect, has the highest death rate—50% of 354 males admitted and 52% of 159 females admitted. The death rate at Wentworth Falls, where patients with the less advanced lesions are sent, was 26% of 61 males admitted. At Thirlmere the death rate was 24.7% of 81 females; at Bodington it was 37% of 83 males. A large number of those who did not die were readmitted to the institutions. Of the grand total, almost 90% died or were readmitted to a sanatorium within five years.

I should like to stress the fact that all the articles to which I have referred were selected at random from the heading in the *Quarterly Cumulative Index Medicus* under the heading of "Pregnancy and Tuberculosis". The British Medical Association library, Sydney, is a mine of information to the student, and I should here like to thank the librarian for her very competent assistance. The papers I found on the subject have all been referred to here, and I have been astounded at the unanimity of opinion expressed by the tuberculosis experts. These have all studied the question carefully; most are undoubted and recognized authorities, who have carefully studied the available results and figures of other authorities. They unanimously express the opinion that the tuberculosis should be the first object of treatment, and that therapeutic abortion should rarely, if ever, be employed, because of its great inherent danger, and because results equally good can be obtained without sacrificing the life of a healthy baby for a dubious benefit to an unhealthy and perhaps in any case doomed mother. According to all authorities the children are born healthy, and remain so if kept away from infections—that is, patients with "open" tuberculosis.

The questions of prophylaxis and treatment now remain. Prophylaxis is of the utmost importance. The disease is almost always contracted from the patient's living in contact with another sufferer with an "open" lesion. Therefore, patients with known "open" lesions should be sent to sanatoria, especially if they are in contact with young children or young adults.

The sanatoria should all have a maternity ward so that patients may be treated by experts during pregnancy,

labour and the puerperium. At antenatal clinics and maternity hospitals routine use of tuberculin tests should be universal, and all reactors should be radiologically examined. Tuberculosis will be found to be present in about the same proportion as in the general population, and will by such a routine measure be detected in time for useful treatment to be instituted.

Better provision should be made by the Government for the support of dependants while a patient is under treatment, for isolation and cure of such patients is of national as well as individual importance, and finance is the rock on which many of our efforts at cure are wrecked.

The after-care of patients discharged from hospital is of great importance. Many such patients, on their discharge, resume their previous occupations, to the great detriment of their health, and all the good of their sanatorium treatment is wasted. There is an excellent scheme at Picton Lakes, whereby cottages are supplied to families in which the bread-winner is unable to follow a regular occupation. There is also provision for single men, but none for women. Such a scheme might be extended with advantage.

If the suggested prophylaxis and treatment are carried out, I am convinced that the lives of many mothers will be saved and the mothers themselves will be enabled in many instances to lead a normal, happy existence with their families. In addition, many healthy infants will be saved to the nation—a work of the utmost national importance.

If the lesion is quiescent, the patient should be watched until the labour with the aid of frequent radiological examinations by a tuberculosis specialist, and appropriate treatment, as regards sufficient rest and adequate food, should be ensured. During the labour the second stage should not be prolonged beyond a bare minimum, the barbiturates and possibly short nitrous oxide and oxygen anaesthesia being employed when necessary. The puerperium should be prolonged to perhaps three weeks to ensure that no flare-up into activity of the lesion is favoured. The infant should not be nursed, so that no additional strain is placed on the mother. After the puerperium the patient should again be immediately placed under the care of the tuberculosis specialist.

If the lesion is active, the patient should be given ample rest and good nourishment, just as if she were not pregnant, but she should be under frequent observation by the tuberculosis specialist at intervals of not longer than two weeks. Collapse therapy is the treatment of election, as all who have tried it have unanimously agreed. The collapse is especially valuable, and must be maintained after labour and the puerperium until the lesion is quiescent. The labour itself should be carefully conducted. No inhalation anaesthetic except nitrous oxide and oxygen must be allowed. A basal anaesthetic should be chosen if possible. Violent expulsion pains may be harmful, and are thought by many to be, together with the post-partum decompression of the lungs, the cause of the patient's retrogression during and after the puerperium. Therefore the second stage, especially in the case of *primiparae*, should be terminated as soon as possible by forceps and perineotomy if necessary. The puerperium should be prolonged at the very least for one month, when the patient may be handed back to the tuberculosis expert, who may consider further rest in bed necessary and treat her just as if she had not been pregnant.

The baby should never be nursed and should be removed from contact with the mother or any other tuberculous sufferer for such time as is considered necessary, according to whether the lesion is "closed" or "open". Very young infants are especially prone to infection; they rapidly become more immune with age. Most infections are contracted in the very early months, and children aged between five years and puberty appear to be relatively immune, according to the survey of Janne and Muir.

The vital statistics of the European races, since the present trend of birth control and so-called therapeutic abortion for all sorts of reasons has come into fashion, give food for thought to all who have the interests of

their nation at heart. Australia, perhaps more than any other white nation, needs population; otherwise racial decay is inevitable, and finally loss of this country of ours, which we are too selfish and unworthy to hold. We cannot expect to be allowed to hold this huge fertile continent empty indefinitely, and the present birth statistics are appalling. The man or woman who destroys our young Australians at their source does the greatest possible disservice to the country. This has been done in the past and is being done in the present, in many cases undoubtedly in good faith and supposedly in the best interests of the patients. But I should like to direct further inquiry, in the case of doctors who practise therapeutic abortion, as to whether this supposition is justified, either in the interests of the patients themselves or for the good of the nation.

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ISOLATION OF A NEW SPECIES OF DYSENTERY BACILLUS.

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FROM the purely bacteriological point of view dysenteric organisms may be described as small, non-motile, Gram-negative bacilli fermenting glucose with the production of acid only and having with certain exceptions no action on lactose. The other group of Gram-negative bacilli responsible for enteric infections are classed under the genus *Salmonella* and are characterized by their motility, the production of acid and gas in glucose, with the exception of *Bacterium typhosum*, their inability to ferment lactose or to produce indol, and their interrelationship by virtue of H and O antigens. As the organism described here has certain characters in common with both these genera, its position in regard to classification is difficult to define. For reasons to be stated later, it is tentatively labelled *Bacterium dysenteriae* Melbourne. The importance of the organism lies in the fact that it is probably a pathogenic organism responsible for gastro-intestinal infections, and has, as far as can be discovered (Bergey, 1939), been hitherto unrecognized. The two cases from which it was isolated were related in point of time and geography, and at the time one of the patients sought medical treatment a mild epidemic of gastro-intestinal infections was prevalent in the district (Weribee, Victoria).

Reports of Cases.

CASE I.—*Bacterium dysenteriae* Melbourne was isolated from an enlarged gland in the ileo-caecal region. The medical attendant, Dr. Anthony Kelly, reported the history as follows. The patient was a male, aged thirty-six years,

who was admitted to the Royal Melbourne Hospital on February 4, 1940. On his admission to hospital he was extremely ill, with severe pyrexia, shivering, sweats *et cetera*, and showed signs of right pleural effusion and peritonitis with considerable abdominal distension. Despite treatment his condition steadily and rapidly deteriorated, and he died on February 8, 1940.

At autopsy he was found to have suffered from a gross phlegmonous typhilitis and colitis, the maximum incidence being in the submucosa, with perforation of the caecum and a localized abscess. The liver contained one large abscess in the right lobe and two or three small abscesses. These abscesses consisted mostly of necrotic material, and in relation to the large abscess there was a subphrenic abscess in the right anterior intraperitoneal space. A diaphragmatic empyema cavity was present on the right side.

Examination of microscopic sections of the caecum, liver abscess and wall of the empyema cavity revealed the presence of gross necrosis, and surrounding this an area of inflammatory reaction. This reaction was mostly on the part of the non-granular cells, though some polymorphonuclear leucocytes were also present. In each of the sections in this region there were numerous large cells about 15 μ to 20 μ in diameter with rather indistinct and eccentric nuclei. These larger cells in many ways resembled *Entamoeba histolytica*, though they could not be definitely diagnosed as such; and it was considered by others that they were probably scavenger cells.

The presence of necrotic lesions in the submucosa of the caecum and ascending colon, associated with liver abscesses consisting mostly of necrotic material, and the presence in the microscopic sections of the same tissues of cells resembling *Entamoeba histolytica*, are rather strong circumstantial evidence that the case is one of amoebic dysentery.

CASE II.—*Bacterium dysenteriae* Melbourne was isolated from peritoneal pus from an ileal ulcer. The case was reported by Dr. Lucy Bryce in the following terms. Mrs. L.M., aged fifty-three years, was admitted to the Queen Victoria Hospital on March 16, 1940, on the recommendation of Dr. A. W. Richards, of Werribee. The patient had been losing weight for two or three months and had had "indigestion" for one month. Three weeks before her admission to hospital she had an acute febrile infection of the upper portion of the respiratory tract, followed in a few days by nausea, vomiting and diarrhoea. Her condition improved with treatment, but on March 15, 1940, blood appeared in the faeces and she was admitted to hospital for full investigation.

On her admission to hospital she was emaciated and anorexic, and was having four or five fluid motions a day. The diarrhoea was partly controlled by treatment, but some blood was present. There was practically no pyrexia, but nausea and occasional vomiting were present. Investigation revealed no definite cause for the symptoms, and the provisional diagnosis was early intestinal malignant disease or chronic colitis. Gradual deterioration in her condition continued and she died suddenly on April 4, 1940.

A post-mortem examination was made by Dr. M. Avery. The relevant findings were low-grade peritonitis with pus in the peritoneal cavity and gross ulceration of the ileum, with a gangrenous patch surrounding two pin-point perforations three inches from the distal end of the ileum. Microscopic examination of the ileal ulcer showed that the ulceration extended into the submucosa, which was largely replaced by granulation tissue with lymphocytes and large mononuclear cells. These were about 20 μ in diameter, with eosinophilic cytoplasm and large nuclei. The possibility that these cells were amoebae was considered, but their morphology was not typical and they were regarded as macrophages.

Bacteriological examination of direct smears of the pus from the peritoneal cavity revealed the usual intestinal organisms. Inoculation on MacConkey's plates yielded an apparently pure culture of small coliform organisms which did not ferment lactose. Preliminary investigation revealed that the organism was probably an atypical member of the dysentery group. It was submitted to the author for inclusion in the present investigation and was found to be identical with *Bacterium dysenteriae* Melbourne.

Discussion.

It may be reasonably concluded from the above evidence that *Bacterium dysenteriae* Melbourne is a potential pathogen which may cause gastro-enteritis as a primary invader of the alimentary canal and severe symptoms as a secondary invader. In the cases described death may have resulted from a bacillary infection superimposed upon an atypical amoebic dysentery.

Bacteriological Characters of *Bacterium Dysenteriae* Melbourne.

In Case I the organism was isolated from an enlarged lymph gland of the ileo-caecal region, and in Case II from pus in the peritoneal cavity. In each case the organism was recovered in pure culture by direct plating onto MacConkey's medium. Both strains were found to be identical by biochemical and serological tests.

Morphology.—The organisms are Gram-negative, actively motile rods measuring 1.4 μ to 1.8 μ by 0.5 μ . They are non-capsulated and non-sporing. There is no characteristic arrangement in a stained smear.

Cultural Characteristics.—The colonies are indistinguishable from those of other members of the dysentery group. On an agar plate, after twenty-four hours' incubation at 37° C., a good growth is obtained; the colonies are smooth, convex and circular (two millimetres in diameter), with an entire edge; they are translucent and have a slight fetid odour. On a blood agar plate after twenty-four hours' incubation at 37° C. a good growth is obtained with no haemolysis. On a MacConkey plate, after twenty-four hours' incubation at 37° C., the colonies are white and circular (one millimetre in diameter). In broth, after twenty-four hours' incubation at 37° C., there is a diffuse turbidity; no pellicle is seen and there is a slight sediment. In gelatin, after five days at 22° C., there is a good growth along the line of inoculation; no liquefaction occurs after thirty days.

Resistance and Metabolism.—Thermal death point is reached after fifty minutes at 55° C. The organism is a facultative anaerobe, its optimal temperature for growth is 37° C., it grows well at 22° C., it does not form haemolysin, it reduces methylene blue, and it forms catalase.

Biochemical Reactions.—The organism produces acid and no gas in glucose, sucrose, galactose and sorbitol, but has no action on lactose, dulcitol, mannitol, rhamnose, maltose and xylose. The fermentation of sucrose and sorbitol requires four and twelve days' incubation at 37° C. respectively. Prolonged incubation for twenty-eight days produces no change in the other sugars. Litmus milk is acid and contains no clot after twenty-four hours at 37° C.; after four days it reverts to an alkaline reaction. Indol is formed in twenty-four hours at 37° C.; nitrates are reduced to nitrites; ammonia is not produced; no sulphuretted hydrogen is produced; the Voges-Proskauer test produces no reaction; the methyl-red test produces a weakly positive reaction. Michaelis's acid agglutination test produced a positive reaction in the last four tubes.

Antigenic Structure.—As antigenic structure is of great importance in the identification of enteric organisms, a considerable number of agglutination tests were carried out. H and O antisera against *Bacterium dysenteriae* Melbourne (from Case I) were prepared by intravenous injection into rabbits. The standard technique of agglutination, which need not be described here, was followed, except that when possible living suspensions of organisms were used. The following suspensions failed to agglutinate with either H or O antiserum: (i) *Bacterium dysenteriae* Flexner Y, V, W, X, Z; (ii) *Bacterium dysenteriae* Sonne; (iii) *Bacterium dysenteriae* Shiga; (iv) *Bacterium dysenteriae*, Boyd's new strains 103, P.119, 88, 59009, 170, P.288, D.1, D.19, P.143, P.274; (v) *Bacterium alkalescens*; (vi) *Bacterium dispar*; (vii) *Bacterium paratyphosum* A; (viii) *Bacterium paratyphosum* B; (ix) *Bacterium paratyphosum* C; (x) *Bacterium typhosum*; (xi) *Bacterium typhosum* "VI"; (xii) *Bacterium gallinarum*; (xiii) *Bacterium London*. Slight agglutination (3% of titre) was observed with *Bacterium dysenteriae* Schmitz. *Bacterium dysenteriae* Melbourne, isolated from Case II, was agglutinated to 90% of the titre with the H antiserum. Through an unfortunate misunderstanding with the laboratory assistant this culture was discarded before O agglutination tests were performed.

Pathogenicity.—Of the laboratory animals used, rabbits and mice were most susceptible, whilst guinea-pigs were unaffected. Massive doses (half of a 24-hour agar slope) injected intravenously into rabbits are rapidly fatal. No

TABLE I.
Biochemical Classification of Nearly Related Gram-negative Bacilli.

Organism.	Motility.	Glucose.	Mannitol.	Lactose.	Sucrose.	Dulcitol.	Indol.	Citrate.
<i>Bacterium dysenteriae</i> Melbourne	+	A	-	-	A	-	+	+
<i>Bacterium dysenteriae</i> Flexner	+	A	-	-	-	-	±	-
<i>Bacterium dysenteriae</i> Schmitz	-	A	A	-	-	A	+	-
<i>Bacterium dysenteriae</i> Shiga	-	A	-	-	-	-	-	-
<i>Bacterium dysenteriae</i> Newcastle	+	A	-	-	-	-	-	-
<i>Bacterium alkalescens</i>	+	A	A	-	-	A	+	-
<i>Bacterium typhosum</i>	+	A	-	-	-	-	-	-
<i>Bacterium coli anaerogenes</i>	+	A	A	A	A	A	+	-

pronounced lesions were to be found. The organism does not produce an exotoxin capable of killing laboratory animals.

Discussion.

The characters described for an organism, tentatively named *Bacterium dysenteriae* Melbourne, refer to its bacteriology six months after isolation. A curious phenomenon was discovered after continued subculture, which apparently was not due to any error of observation. On first isolation both organisms from Cases I and II were recorded as non-motile by three independent observers working in different laboratories. In spite of careful tests made with organisms from 15-hour liquid cultures and water of condensation of 24-hour slope cultures, no motility was observed. However, reexamination of the organism some six months later revealed that it was actively motile, even in old cultures. Agglutination tests with H and O suspensions of the organism with an antiserum previously prepared from formalized suspensions of the "non-motile phase" showed agglutination only with the H flagella suspension. Biochemical tests revealed no significant change, except that mannitol, which was slightly fermented after ten days' incubation, was now unaffected. The only interpretation open to us is that the primary non-motility was due to sluggishness rather than to absence of flagella on first isolation.

As will be seen in Table I, it is difficult to assign a place for this organism with the dysentery, salmonella or coliform types of Gram-negative bacilli. The active motility would tend to place it outside the dysentery group, whilst the lack of gas production and the serological tests do not suggest a salmonella. It is not a coliform organism, because gas is not produced in sugar media, nor is lactose fermented. On the other hand, indol production and growth in a citrate medium may suggest a coliform intermediate; but in view of other characters this is not likely. In spite of several objections, for example, the organism's motility and growth in citrate, one can only diagnose the organism as an atypical dysentery bacillus.

As regards its role as a human pathogen, we must rely on the circumstantial evidence that the organism was recovered from lesions in which no other pathogenic organism was found and in which the presence of *Entamoeba histolytica* was in doubt. Furthermore, the bacteriological findings are indicative of a pathogenic type of intestinal organism. Admittedly the evidence is not truly convincing; but it is hoped that at some future date *Bacterium dysenteriae* Melbourne may be isolated in less equivocal circumstances.

Acknowledgements.

My thanks are due to Professor P. MacCallum, who sent me the lymph gland from which this organism was first isolated; to Professor H. A. Woodruff, for his interest in the work; to Dr. Anthony Kelly for his description of Case I, and to Dr. Lucy Bryce, who isolated the organism from Case II and for her description of this case.

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REFLECTIONS ON THE OPERATIVE TREATMENT OF GLAUCOMA.

By E. TEMPLE SMITH,
Sydney.

In these desultory notes I am not concerning myself with the pathological changes—metabolic or toxic—which underlie the etiology of that strange and complex disease glaucoma. I would, however, draw attention to the anatomical changes which accompany it when the disease is established. I mean swelling of the vitreous, which pushes forward the lens with shallowing of the anterior chamber, narrowing of the filtration angle and blocking of Schlemm's canal. To remedy the resulting rise of the normal "tension" many operations have been devised.

When I have proved the worth of any procedure I am inclined to be conservative; but when I am not quite satisfied I am, like the Athenians of old, seeking after some new thing.

"Elliot's sclero-corneal trephining may well become the operation of the future." With these words I closed the last chapter (contributed by request) of Elliot's handbook on sclero-corneal trephining, twenty-nine years ago. I was working under him in Madras at the time, and might have been expected to be prejudiced in its favour. I have, like others, had much success with it; and, like others, I have had many disappointments and a few disasters. I have never ceased to try to find something better. Its chief claim is its simplicity, though I never regarded the trephine as a nice tool. I prefer a knife, which is more controllable. In trephining an eye we punch a disk out of the coat of the eye at the limbus, as far forward as possible, according to Elliot's teaching, to avoid the ciliary region, covering the hole with a conjunctival flap, under which drainage is expected to take place. To do this the trephine is usually tilted forward towards the cornea, with the result that in the outer scleral portion of the hole Descemet's membrane is liable to be missed; and, as the corneal portion will probably proliferate, the result is nil. If one trephines further out, one may open into the vitreous chamber, which again nullifies the operation. The so-called "splitting of the cornea" means a dangerously thin covering; and this leads to one of the definite dangers of trephining, ulceration and septic infection at a later date, and possible loss of the eye. We must all have met with this unfortunate result. Another danger is retinal detachment (as contrasted with chorioidal detachment, which is only temporary). This is the result of too complete and too prolonged absence of the anterior chamber. I have met with this three times. In the case of failure of drainage it is practically impossible to repeat the procedure in the same eye, for anatomical reasons. In the plastic, congestive type of glaucoma it almost always fails; also, in my hands, it almost always fails in buphthalmos.

I believe that blocking of the hole, apart from the points of technique already mentioned, is chiefly due, and is in direct proportion, to the amount of dissection done to expose the site for application of the trephine. It is possible that Green's mechanical trephine will obviate the necessity for such dissection and exposure of tissues. That will be all to the good; but it will not do away with the other disadvantages I have mentioned. The trephine operation opens the eye from without in, a method in itself

not without danger. On the other hand, the Lagrange operation, to which I now wish to refer, aims at opening the eye from within out. This is at once a safer and more "surgical" procedure. It sets out to divide the cribriform ligament at Schlemm's canal and to open up the filtration angle, thus restoring communication between the anterior chamber and the subchorioid lymph spaces; and this it appears to do permanently. Hence, since it attacks the most conspicuous anatomical fault, it has a sound pathological basis. Trephining, when successful, which it generally is in simple chronic glaucoma, is so only for mechanical reasons. Furthermore, in the Lagrange operation there is no dissection. This is, I think, the reason for its certain functional success. The conjunctival flap heals at its edges, and good drainage is shown by the flat, well-covered, boggy area at its site. There is not as a rule the prominent bleb which is occasionally complained of so much after trephining, and in a few cases in which there was no obvious drainage the tension became and remained normal. This supports the impression I have that it is the opening of the filtration angle that ensures its success, almost as much as the adventitious drainage provided by the sclerectomy.

The operation was first suggested by Felix Lagrange in 1906. I tried it once at that time in an acute case, but knowing nothing of the finer points of its technique, decided that it was dangerous. Trephining evidently does not give universal satisfaction, for it is little used on the Continent; and both there and in England all sorts of measures are in vogue, all aiming at the obtaining of a better and safer filtering cicatrix. Iridencleisis and iridodialysis have their votaries. The former always seemed to me to have risks of its own and the latter to be uncertain. If iridodialysis could be shown to be certainly successful, it surely would be the operation of choice. It is easy, simple and free from all risk. I have tried it twice. In one case, a simple chronic glaucoma, it seemed to work; in the other the success was not permanent; but as its exact technique seems never to have been described I may not have made a large enough separation of the iris. I should like to know more of this operation. Like all other eye operations, an exact and precise technique is needed for success.

In *The British Journal of Ophthalmology* of September, 1937, Henri, the son of Felix Lagrange, to commemorate the thirtieth anniversary of his father's publication of his operation, wrote a detailed account of the technique. It is a masterpiece of clear expository writing. Between the text and the diagrams nothing is left unexplained, and every possible happening is dealt with. One peculiar point is that the conjunctiva must be seized by fixation forceps on the same side as that on which the puncture is made; for instance, in the left eye the conjunctiva is seized at the five o'clock position, the puncture being at the one o'clock position. This small point, which would never occur to one spontaneously, is vital, as, for mechanical reasons, it prevents rotation of the eye away from the knife when the counter puncture is made. I have devised a further addition to this technique which I think is very helpful. This is to insert a fine scleral silk stitch at the site selected for fixation. Many of these eyes have a very friable conjunctiva, which may tear at a critical moment. To seize the firm silk knot will forestall such an embarrassing moment. If the case is acute or subacute, and a general anaesthetic is needed, another scleral stitch is inserted at the six o'clock position, by which the eye may be drawn gently down while the operation is completed. Another simple measure, easily overlooked, is to be sure that the head is slightly dependent. This will prevent blood—for the operation is by no means bloodless, as in trephining—from filling the anterior chamber; it will not run up hill. The reaction is very slight, much less than after trephining, convalescence is rapid, and a week in hospital suffices.

As to results, unfortunately I have not tabulated them. But in the last three and a half years I have done between sixty and seventy of these operations, mostly in public hospitals, and there have been only three in which the success of the drainage was doubtful, and only one in

which I have repeated the operation. In these the faults of technique were obvious; I was learning. And the operation has this advantage, that it can easily be repeated at the side or below in the same eye, if success has not been attained. But I consider that it is almost 100% effective if carried out with accuracy and precision.

I have performed the operation below, with a permanently successful result, in two desperate cases in which trephining had been carried out twice with failure of drainage. Recently I applied it to one of those most trying conditions of secondary glaucoma with chronic iritis and *iris bombe*, in which there was no response to treatment with atropine and repeated paracentesis, and in which an atropine allergic reaction then developed. A Lagrange operation with a buttonhole iridectomy has had the happiest result. Eumydrin, a detoxicated form of atropine, was of value. I will venture to say that no other operation was applicable. A large iridectomy would have resulted in bleeding and effusion, and a trephine would have become blocked.

So far I have made two converts in Sydney, but I hope to make more. As I have said, we have all had a large measure of success with trephining, but what we should aim at is to have no failures. I think trephining is doomed to failure in the subacute type of glaucoma and in those obscure types on the border line between primary and secondary glaucoma. I have not described the operation, as I should prefer that anyone who proposes to do it should read the account in the journal that I have mentioned.

Summary.

To summarize: the Lagrange operation has the following advantages:

1. It has a sound pathological basis; it opens up the filtration angle. Trephining only makes an adventitious vent in front of it.
2. It is more uniformly effective because it entails no dissection of tissue, which dissection so often leads to adhesions and failure.
3. It is safer, because one works from within outwards.
4. It has a minimal local reaction.
5. It is free from complications and sequelae.
6. It is applicable to all forms of glaucoma.

Conclusions.

I have felt impelled to write this paper by the growing conviction that this operation offers more nearly than any other the criteria we are all seeking—safety and certainty—and that, fulfilling the injunction to prove all things and hold fast to that which is good, I want to pass this experience on to others, in the hope that those who are not perfectly happy about trephining will try it.

Reviews.

DISEASES OF INFANCY AND CHILDHOOD.

DR. SHELDON'S book "Diseases of Infancy and Childhood" was first published in 1936. A second edition was necessary in 1938 and the third now appears two years later.¹ Several new conditions find mention for the first time—congenital cystic disease of the lung, tetany of the new-born *et cetera*. Newer methods of investigation and treatment are brought up to date. Among the subjects revised are the tuberculin patch test, the use of zinc-protamine-insulin, eumydrin in pyloric stenosis, and apple diet in diarrhoea. The section on infant feeding has been fully revised. Valuable features are the appendices. There is one on the dosages of drugs for infants and young children. Another is on the administration of sulphamidamide and its derivatives. A valuable new one states the average vitamin requirements and has a table with a description of the commercial vitamin preparations. This book should have a long life and can be confidently recommended.

¹ "Diseases of Infancy and Childhood", by W. Sheldon, M.D., F.R.C.P., with a foreword by F. Still, K.C.V.O., M.A., M.D., LL.D., F.R.C.P.; Third Edition; 1940. London: J. and A. Churchill Limited. Demy 8vo, pp. 763, with 130 text figures and 14 plates. Price: 24s. net.

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HUMANISM, SCIENCE AND GOD.

A FEW months ago men were classified in these pages into two groups, those who possessed and those who did not possess an innate curiosity, a desire to explore their environment. Incidentally we pointed out that though it may be true that "he who increaseth knowledge increaseth sorrow", when knowledge lays bare the ills of society, sorrow may be turned into joy if it is translated into service. In other words, intellectualism may be made to subserve a useful end. Clearly this observation was but one of many that might be made about knowledge gained by men who have an innate curiosity. Knowledge newly acquired does not always lay bare any of the ills of society; it may not discover anything, but may remain as an isolated fact without any apparent significance. This will not make the knowledge any the less important; for what is apparently discrete and useless today may tomorrow be the keystone in the arch of a great truth. But most men, as is but to be expected, look naturally at what has a relationship to their own personalities. This is as true of men of science as it is of those who cannot be so grouped. We may thus carry our consideration of innately curious man a stage further, and the occasion has been prompted by the publication of a Linsly R. Williams Memorial Lecture by Alan Gregg, who is Director of the Medical Sciences at the Rockefeller Foundation.¹ In this most fascinating discourse, which he has called "Humanism and Science", Gregg states that whenever man has been permitted by circumstances to enjoy the luxury of reflection, he has been drawn repeatedly by three types of relationship—his relation to God, his relation to himself and to his fellows, and his relation to the world of Nature. From this he goes on to explain what he means by humanism. Anyone who sets out to discover what humanism means will be told by the text-books that it arose in the fourteenth century as a revolt against slavish

adherence to the dogmas of theology. "Man's relation to God has become a preoccupation so elaborated and so dominating as to minimize, if not to exclude, reflection upon man's relation to man and to the natural world." History shows that the theologians were so powerful that any who expressed their own views on the phenomena of Nature were subjected to ignominy and persecution. Gregg reminds us that by the humanism of the Middle Ages man was reestablished "as the delightful object of fresh free contemplation, and not the mere victim of theological orthodoxy and its allied political despotism"; this was not a birth, but a revival, a resurrection. "In its reverence for the residual wisdom of the ancients blended with astonished delight at the rediscovery . . . of human values." In fact "it was something like finding that your great-grandfather's watch keeps perfect time". Gregg explains that the humanist is not a worshipper of the past; if he is retrospective, it is to round off his perspective. Neither is he a modernist; his aversion to modernism is due to his dislike of the pride that characterizes belief in all that is modern. Contemporary pride glories in an ineffable certainty that all men, being modern together, are therefore insuperable. "To insist that the present is pregnant with perfection is a sort of provincialism not in space but in time." Thus we can appreciate Gregg's view of humanism. It may be summed up by stating that the humanist in common with the scientist is "interested in those uniformities which repeat and reappear in the manifold of experience". Science offers man no system of values, no canons of good taste; it is interested in what has logic, order, system, and often in what has use. The humanist, on the other hand, "though not indifferent to logic, system, and order or usefulness, predominantly interests himself in what has value—in what long experience has shown to be the delights and satisfactions proper to mankind".

But the question will be asked: "What special application, if any, has this to medicine or medical practice?" The answer should be fairly obvious. Gregg supplies it by referring to a statement by Balfour in the Gifford Lectures of 1914 that "science like common sense regards the things which are experienced as being themselves unaffected by experience". It is the physician's task not merely to observe, but also to reason to a conclusion and to treat. How long, asks Gregg, does the patient remain "unaffected by the experience"? Eventually, he points out, there comes a miraculous moment when the doctor becomes the treatment. All medical practitioners with any depth of experience must have felt this and the heavy responsibility that comes with it. It is just there that "science, the fruit of man's preoccupation with nature, must give place to humanism, the flower of man's experience with man". At this stage are needed the riches of humanism. Disease has many facets; of these the most obvious are pain, disability and death, and over them science has won and will yet win triumphs. The day of science is by no means closing, but disease has other aspects, such as "uncertainty, or fear and shame and the distress of letting down one's fellow men". These aspects of disease, Gregg points out, are often the hardest to bear; medical practitioners are poorly prepared to counter them, and science alone has nothing much to offer. The true physician, Gregg insists, cannot remain outside the manifold of the events he observes, and upon

¹ Bulletin of the New York Academy of Medicine, February, 1941.

this simple fact may rest the whole argument for the alliance of medicine with humanism.

Gregg has many interesting observations to make on medicine and humanism; we propose to follow him in only one. He is insistent that the resources of humanism must be opened to medical students for the enrichment of their training. If during the years of medical and premedical education the student has omitted all cultivation of tastes and all reflection upon ultimate values and the selection of canons of human behaviour, how can he be expected, asks Gregg, to have the spiritual valences that will enable him to combine effectively with patients in the bewilderment and loneliness and anxieties of illness? Although he does not specifically make the statement, Gregg would apparently have all spiritual valences created by the application of humanism to science. This view of his belief would appear to be justified from the fact that though in the early part of his address he mentions man's reflection on three types of relationship, he discusses two at some length and has no mention of man's relationship to God. Clearly among different men, particularly among the scientifically trained, the conception of the nature of God will vary widely. Though it may not be the function of a medical journal to inquire into such a subject, fascinating though it be, a discussion on humanism and science will be incomplete without such a reference. Gregg was undoubtedly right when he included reflection on the relationship of man to God among the subjects to which man's thoughts are repeatedly drawn. Many men carry their inquiry into this relationship a stage further, so that inquiry becomes a search. A. N. Whitehead shows¹ that religion is the reaction of human nature to its search for God. To many men, therefore, religion is more than a tag to be assumed for the purposes of census, marriage or burial. In view of the great value of his communication, it would have been interesting if Gregg had told us his ideas on the relationship of man to God. Some humanists reject the idea of God. For example, Julian Huxley is stated² to have rejected the idea of God in a book entitled "The Uniqueness of Man", that has not yet reached Australia, "because he has a conception of the Deity which he finds inadequate—namely, that of a ruler". Huxley, we are told, defines the aims of humanism as being "to have life and to have it more abundantly" (words taken from the New Testament). The reviewer of Huxley's book states that the theological conception of God is primarily that of the ultimate reality in the universe, the unchanging substrate of changing phenomena. In this sense, he adds, it is idle to dispute whether God exists; the question is rather, what else exists. That "full and purposive living" can be achieved by the application of science to the world around us is a view that has its attractions. But, it is pointed out, "one would have expected recent history to have cooled the ardent expectations of Victorian science". Increase in power and knowledge does not necessarily bring increase of happiness and true satisfaction. The distinction between humanism and Christianity was well drawn by Henri Frederic Amiel when he described the former as intellectualism and the latter as moralism.³ The humanists, he wrote, wished to supplant religion with

philosophy—their religion was the religion of thought. He held that if knowledge did not give love it was insufficient. He contrasted intellectual love with moral love, and held that the one was critical, purifying, negative, and the other was vivifying, fecund, positive. Knowledge, however spiritual and substantial it might be in itself, was yet formal relatively to love. Moral force was therefore the vital point. "Knowledge is the power of man, and love his strength; man becomes man only by the intelligence, but he is man only by the heart. To know, to love, to be able: that is the complete life." In a leading article in the journal that reviews Huxley's book we are told that when Huxley declares that "God is no longer a useful hypothesis" he is really calling a halt where the human mind will never be content to rest. With this most thinking men will agree. In this same leading article mention is made of Sir Charles Sherrington's recent Gifford Lectures (so far unobtainable in Australia): "Nobody asks empirical science to go beyond the conclusions that research in its special fields permits. When Sir Charles Sherrington declares that the apparition of man with his moral standards in the midst of the possibly intelligent but certainly often barbaric process of the struggle for life within Nature represents a 'revulsion of the product against the process', an apparent 'frustration of itself' by evolution, his words may be accepted—but only as the statement of a problem still to solve." So we see that inquiry and search must still go on.

To present God only as power is fatal to his acceptance; the only possible outcome is that he will be denied, as has apparently been done by Huxley. Whitehead can see no other course, for he holds that the presentation of God under the aspect of power awakens every modern instinct of critical reaction. "Religion collapses unless its main positions command immediacy of assent." Science has had an effect on religion. It has effected a change in psychology and in this way it has, according to Whitehead, weakened the hold of the old religious forms of expression. Humanism, too, has had an undeniable effect on religion, for it demands that religion shall be shorn of outworn superstitions and that it shall be vital and practical. Some conclusion of the matter must be stated for the purposes of this discussion—there will and can be no general conclusion of the matter in the quest of science, of humanism and of God. On the present plane of existence man will never apprehend truth; he is destined always to pursue and never to overtake. This is what gives zest to life. From whatever point of view we regard the spiritual life of man, most of us will agree that man has in him something of the divine spirit, and we may therefore assert that God and humanism are inseparable. If we regard God as "the ultimate reality in the universe, the underlying substrate of changing phenomena", we have a key for the interpretation of our discoveries in humanism and science and a foundation on which to build for the future. If we do not do this we remain intellectuals and nothing more, and even then we may be defeated if we seek for an explanation of the origin of intellect. If we do accept the basic reality of God, we shall find a purpose in life. This acceptance may not make for an easy way of living; it would not be really worth while if it did—we are looking for truth and not for comfort, and we want to be citizens in a commonwealth of spiritually free men.

¹ "Science and the Modern World", 1930, page 237.

² "The Times Literary Supplement", April 12, 1941, page 178.

³ "The Private Journal of Henri Frederic Amiel", 1935, pages 26-28.

Current Comment.

SULPHONAMIDE DERIVATIVES AND THE URINARY TRACT.

THE introduction of such potent drugs as sulphonamide and its derivatives was, as might have been expected, soon followed by reports of the appearance of toxic symptoms. The commonest of these is cyanosis; it is as a rule of little significance and can be neglected. The most serious, and fortunately the rarest, is agranulocytic anaemia. Jaundice has been recorded and haematuria. A great deal of work has been done in regard to the formation of uroliths after the administration of sulphonamide drugs. At a clinical meeting held in Sydney in June, 1940, J. G. Edwards showed skiagrams of what were regarded as sulphapyridine calculi. (See THE MEDICAL JOURNAL OF AUSTRALIA, November 16, 1940, page 514.) Attention should also be drawn to an article by Y. F. Tsao *et alii*,¹ who in 1939 reported five cases in which renal complications had followed the administration of sulphapyridine to children; one of the children died. In the fatal case autopsy revealed complete bilateral obstruction of the urinary tract by uroliths; uraemia was the cause of death. The chief symptom in the five cases was haematuria; in one case it occurred within twenty hours of the administration of the drug. Dosage did not seem to be an important factor, but most of the patients among whom the group of five was found, were suffering from general nutritional deficiency, dehydration and poly-avitaminosis in addition to their chief complaint. Tsao and his fellow workers did not come to any definite conclusion regarding the causation of the haematuria, but thought that it was probably the result of direct trauma on the urinary structures by spiculated calculi. H. Southworth and C. Cooke have also reported three cases in which haematuria was associated with the administration of sulphapyridine.² In the two cases in which the determination was made, nitrogen retention due to renal insufficiency was present. None of these patients had shown evidence of urinary tract disease before the administration of the drug for pneumonia. As soon as the administration of the drug was stopped the abnormal manifestations disappeared.

Interest in this subject centres chiefly around the experimental work. In March, 1939, W. Antopol and H. Robinson reported that by the administration of sulphapyridine to rats, rabbits and monkeys, they were able to bring about the formation of uroliths in the urinary tracts. In May of the same year P. Gross, F. B. Cooper and M. Lewis reported that they had in two weeks or less produced urinary calculi containing 6.4% of sulphapyridine and 64.1% of acetyl-sulphapyridine in twenty-seven of thirty-nine rats by the oral administration of one gramme of sulphapyridine per kilogram of body weight. These workers found that the urinary calculi caused death in some instances and in others varying degrees of renal damage—complete or partial urinary obstruction with associated haematuria or pyelonephritis as well as retention of sulphapyridine. W. Antopol with D. Lehr, J. Churg and H. Sprinz³ have now described the pathological changes produced in albino rats by the single intraperitoneal injection of a large dose of the sodium salt of sulphapyridine, of sulphathiazole and of sulphamethylthiazole. Complete autopsies were made of more than one hundred and fifty animals and the urinary tract was specially studied. The findings are described in considerable detail, and well-produced photomicrographs illustrate the findings on histological examination. The most pronounced changes were caused by the sodium sulphamethylthiazole, and these comprised intrarenal precipitation with urolith formation accompanied by severe damage to the kidneys and liver. After the injection of sodium

sulphathiazole large amounts of precipitate of the free compound were found in the renal papillae, ureters and bladder in every case, even if the animals died as early as two or three hours after the injection. Analysis of the precipitate showed it to consist almost entirely of free sulphathiazole; this is in contrast with the high amounts of acetylated derivatives found in uroliths after "chronic" administration of sulphapyridine and sulphathiazole. The findings with sulphathiazole were assumed to be due to the high rate of elimination and the lack of reabsorption of the compound from the renal tubules. If an animal survived a single high dose of sulphathiazole the precipitate was usually washed out of the kidneys within twenty-four hours. The signs of irritation in the kidneys, such as oedema and congestion, passed off quickly if the precipitate was rapidly washed out. With smaller doses, repeated often ("chronic administration"), renal concretions could be produced with each of the three compounds and were due to the formation of their very insoluble acetylated compounds. The appearance of concretions was as a rule accompanied by varying degrees of calcifying nephrosis, mainly of the distal convoluted tubules, but sometimes also of the collecting tubules. Extensive and severe calcifying nephrosis was produced by a single intravenous injection of any of the acetylated derivatives of the drugs.

That the greatest caution must be exercised in the interpretation of pathological changes in human tissues in the light of the results of animal experiment is, or should be, widely recognized. Even if we remember the need for this caution, we are probably justified in regarding the haematuria that appears in man after the ingestion of sulphonamide drugs as a toxic effect of the drug. Whether this is a mechanical effect, as assumed by Tsao and his fellow workers or a toxic process is not clear. Future work will probably determine the issue. The practical point that emerges is that no patient should be treated with drugs of the type in question unless he is under the observation of a medical practitioner. Particular attention must be paid to the urinary tract and the urine must be examined frequently—especially in children. Any abnormal manifestation must be regarded as a warning that administration may have to be suspended. The possible relationship between susceptibility to sulphonamide drugs and nutritional deficiency, as noted by Tsao and his fellow workers, may be worth special investigation.

THE SURGICAL TREATMENT OF SPONTANEOUS CEREBRAL HÆMORRHAGE.

It has been said that audacity is one of the qualities that go to make a successful surgeon, and most clinicians will agree that this quality is displayed by a surgeon who sets out to operate in the hope that he will enable a patient to recover from the effects of spontaneous cerebral hæmorrhage. Hæmorrhage of this type occurs most frequently in persons whose arteries are affected by some pathological condition and who would not be regarded as suitable subjects for intracranial operation. However, a wise man is surprised at nothing, and in surgery particularly it is well to keep an open mind. In a recent report by L. T. Furlow, A. D. Carr and C. Wattenberg¹ we are reminded that in the early years of this century investigators not only suggested that operation might be undertaken in certain cases of spontaneous hæmorrhage, but had the courage to put their beliefs into practice. Furlow and his two collaborators report five cases in which they thought operation was justified. They state that Merritt divided cerebral vascular lesions into four groups: (a) primary subarachnoid hæmorrhage, (b) cerebral embolus, (c) cerebral thrombosis, (d) cerebral hæmorrhage. They regard it as quite certain that in the light of present-day knowledge surgery should play no part in the treatment of the first three of these groups. Merritt held that in rare instances a cerebral hæmorrhage

¹ The Journal of the American Medical Association, September 30, 1939.

² The Journal of the American Medical Association, May 6, 1939.

³ Archives of Pathology, May, 1941.

¹ Surgery, May, 1941.

might become encapsulated and present the symptom complex of tumour; though such had occasionally been removed with success, he thought that this form of treatment was still in the experimental stage and was adapted to only a very small percentage of cases. W. B. Cadwalader in 1914 studied cerebral hæmorrhage and vascular occlusion and concluded that most cerebral hæmorrhages were large and that only a relatively small percentage of cases was rapidly fatal. With these facts in mind, Furlow, Carr and Wattenberg have resorted to surgical operation in five cases of cerebral hæmorrhage, and the records of these cases form the basis of their present report. At the outset they make it quite clear that they do not advise surgery as the primary treatment in cerebral hæmorrhage, for in no single instance have they carried out operation unless there was definite evidence of increasing intracranial pressure. Our present aim in drawing attention to their work will best be achieved if a short account of the main features of these cases is given.

In the first case all that was necessary was the aspiration of old blood through a perforator opening. The patient was a hypertensive and diabetic man, aged forty-six years, who was admitted to hospital three days after a seizure that occurred while he was driving his motor car. His main complaint was headache. Lumbar puncture two days after his admission to hospital yielded bloody fluid which contained crenated red cells. Headache was relieved. In spite of this relief and further lumbar puncture homonymous hemianopsia occurred and both optic disks were choked. It was then, twenty days after his admission to hospital, that operation was performed. Six days later he was discharged from hospital, and two and a half months later the hemianopsia had disappeared and the patient was carrying on his usual occupation.

In the second case the patient was a girl, aged nineteen years, who was admitted to hospital in a stuporose state, having been ill for twenty-four hours. She had previously complained of headache. Lumbar puncture suggested an expanding lesion. Her condition began to deteriorate and ventriculography was undertaken. The films revealed a ventricular shift to the left side with a downward and forward displacement of the right posterior horn and posterior part of the ventricular body. Craniotomy was performed and on incision of a convolution a firm well-organized blood clot was removed. Recovery was uneventful. The cause of the hæmorrhage in this case was never determined; it was thought likely to be a small miliary aneurysm.

In the third case there was a left-sided lesion and hypertension was present. The patient was a woman, aged fifty years. After waiting for fifteen days, the authors decided that conservative treatment had lasted long enough. Craniotomy was performed and blood clot was removed after incision of the temporal convolution. Recovery took place slowly and was almost complete. This is a case in regard to which difference of opinion will be expressed. Furlow and his co-workers admit that it is not possible to be certain whether an equally good result would not have occurred with conservative treatment. As the patient was going downhill before operation they were no doubt justified in what they did.

The fourth case was the only fatal one in the series; it is explained that surgical operation was too long delayed and that the progression of an obstructive hydrocephalus was unrecognized. The patient was a woman, aged fifty-nine years, who was found to be the subject of generalized arteriosclerosis with moderate hypertension. First of all she suffered from a condition that was diagnosed as subarachnoid hæmorrhage, and she was discharged from hospital after lumbar puncture had initiated an improvement in her condition. Later she was readmitted to hospital with symptoms of hæmorrhage that gradually became more pronounced. Eventually the following note was made of her condition: "For over six weeks this patient has been comatose, with no response to any stimulus. There are periods of rigidity, and her blood pressure, although constantly elevated, is extremely variable. For the first time today she shows some

papilloedema, and in view of this evidence of increased pressure I think we should do a ventriculogram to see if there might be a removable clot." Ventriculography was undertaken and the indication being found, craniotomy was performed. In the prefrontal area a circular area of cortex was excised and at a depth of four centimetres a cavity containing old well-organized clot was exposed. The clot was removed and the posterior part of the cavity was seen to communicate with the ventricle. The source of the bleeding could not be determined, but no fresh bleeding occurred after the clot was removed. Eventually the patient died of bronchopneumonia. At autopsy there was no evidence of recent bleeding, but there was an internal hydrocephalus with obstruction of the foramina of Magendie and Luschka. The source of the bleeding could not be discovered and there was no evidence of an aneurysm.

The fifth case somewhat resembled the second, for the patient was a man of thirty years who had no evidence of hypertension.

The five cases dealt with in this report are certainly unusual, and the measures adopted were heroic. Some will possibly declare that Furlow and his collaborators were fortunate in coming into contact with such cases. Granted that they were fortunate, it must also be granted that they were not lacking in initiative. It would be easy to dismiss the whole subject as one in which the surgeon would be asking for trouble. The question arises whether the four patients in the reported series who recovered would have recovered if operation had not been undertaken. Hæmorrhages may be so extensive that the blood clot does not become absorbed, and in the reported cases the amount of blood clot was considerable. It is safe to conclude that had the patients recovered (which is very doubtful) they would have been left with disabilities which were in fact avoided. Furlow, Carr and Wattenberg state their conviction that surgery should be undertaken only (a) when conservative measures have failed to produce improvement; (b) when there is some definite evidence of increased intracranial pressure, such as choked disk, slow pulse, or high spinal pressure; (c) if the presence of arteriosclerosis and hypertension does not constitute a contraindication to operation. Even if these conditions are accepted, surgeons will agree that success will be granted only to those among their number who have a nicety of judgement and the audacity that has already been mentioned.

MEDICAL INSPECTION OF SCHOOLS IN WESTERN AUSTRALIA.

In May of this year attention was drawn in these pages to the importance of the medical inspection of school children and to its place in the practice of preventive medicine. The discussion centred around the report of the Chief Medical Inspector of the Education Department of Victoria, and it was stated that the departmental medical officers engaged in this work could not be held responsible for its incompleteness. It is our firm conviction that the reason for any lack of effectiveness is to be found mainly in the handicap imposed by smallness of staff and possibly in the lack of cooperation of persons outside the medical branch of the department.

Early in July of this year there came to hand the report of Dr. Eleanor M. Stang, Senior Medical Officer of Schools of Western Australia, for the years 1939 and 1940. (In Western Australia reports of this kind are issued only every two years.) Dr. Stang's report discloses a state of affairs of which Western Australia cannot be proud. She states that in her report for 1937-1938 she pointed out that the school medical staff had been depleted—that the services of one medical officer and one school nurse had been dispensed with, and that they had not been replaced. She now writes: "This very unsatisfactory state of affairs still exists, with the consequence that every year the examination of the school children in the metro-

politan area is getting more and more behind hand, and consequently neglected." For the whole of the work in the metropolitan area there is now only one medical officer engaged on half-time duty. That this officer examined 5,527 children in 1939 and 5,709 children in 1940 is little short of amazing. Dr. Stang states that "the country officer still works full time", as though she expected some cheese-paring to be done in that direction. However, it would be difficult to employ a medical officer on half-time duty in the country in Western Australia, and we may hope that the country children will continue to be "fortunate" and "adequately dealt with". Dr. Stang is justified in her statement that the children in the metropolitan area are being neglected. When she came to the State in 1925 there were three full-time nurses and two medical officers working in the metropolitan area alone. Now, sixteen years later, there are only two full-time nurses and one medical officer who (as already stated) works on a half-time basis. The public does not need to be told that in these sixteen years there has been no decrease in the number of children. The number of children has grown with the increase in the population. The public needs to be reminded that both medical officers and nurses are required for the inspection of school children. The medical officers make the examinations and the nurses do the "follow-up" work. Without the latter the examinations would not be effective, for sometimes as many as four visits have to be paid to the homes of the children before any steps are taken to have carried out the remedial measures found necessary at the examination. Even then numbers of people have to be entered up as "out".

There is no need to traverse again the many reasons that make the examination of school children an essential part of community life; but the people of Western Australia must be made to realize that the state of affairs at present existing is, to use Dr. Stang's words, regression and not progress. The fighting of a great war does not justify any complacency about this regression; now more than ever is there reason to pursue health and bodily vigour, and these must be assured in the young before they can be expected to appear in older persons.

THE PSYCHIATRIC EXAMINATION OF RECRUITS.

ALL who are interested in the psychiatric examination of recruits for service in the defence forces should read a short article by Harry Stalker,¹ who is lecturer in psychiatry to the University of Edinburgh. Those who undertake the medical examination of recruits agree that no reliance can be placed on the statements of the average man who volunteers for active service when he is asked about his previous state of health. In regard to a condition such as tuberculosis it is possible by radiological and other methods of examination to determine whether a recruit is suffering from active or latent disease and to make a decision on the findings. Incidentally many a man when he is faced with the fact that X-ray examination has revealed a tuberculous infection, will own that his statements on enlistment were not true. With mental disability the problem is extraordinarily difficult. Unless it is known that a man has been affected by mental disease and has, for example, been a patient in a mental hospital, even a trained psychiatrist may be quite unable to discover a disability. Stalker writes of thirteen former patients of a mental hospital who did not reveal their psychiatric condition and were passed as fit. Two at the time he wrote had not been called up and six had broken down or were showing gross symptoms. Similar stories could be told by psychiatrists in this country. Since the beginning of the war Stalker has been consulted about 38 male patients of the same mental hospital. Most of the men came for examination on their own initiative and some were sent by recruiting medical boards. A summary of each patient's illness was submitted to the boards; it was suggested that

31 were unfit for any kind of military service and that seven were fit for full or modified service. In only two instances were the suggestions not accepted by the boards; in these a suggestion of modified service was made and full service was ordered. The 31 men were grouped as follows: paranoid reaction, 1; manic-depressive reaction, 1; schizophrenic reactions, 9; schizoid states, 4; psychopathic states, 2; feeble-mindedness, 1; epilepsy, 1; anxiety states, 9; hysteria, 2; neurasthenia, 1. Full service was recommended for three and modified service for four men. Of the seven, four have not been called up; one of those raised from modified to full service developed fresh symptoms in the army and was discharged, one man is serving and one has not been traced.

Stalker's short report shows that when a man's previous mental history is known it is possible to determine with reasonable accuracy his suitability for service. This was already well enough known to those who cared to think about it. Stalker makes two suggestions, neither of which would appear to be practicable in this country. The first is that if psychiatric departments were compelled to notify their cases many unsatisfactory recruits would be rejected. The second is that on enlistment recruits should be asked to present a statement of their previous medical history obtained from their own doctor. It would be simple enough for a man to vow and declare that he had never had a doctor. He also refers to a suggestion that psychiatrists should be appointed to recruiting boards, but, as already mentioned, this could not be expected to be entirely successful. The only possible deterrent to the making of false declarations by recruits is the promulgation of a statement by the authorities that a man who was deliberately misleading would run the risk of being deprived of pension rights if his breakdown was the result of a condition about which he had lied. Whether the authorities would be prepared, or would be allowed by the politicians, to go as far as this is doubtful. But this may have to be considered, for, apart from the waste of time and public money involved by their enlistment, the presence of mentally affected soldiers among disciplined men may have a serious effect on morale and lead to disaster.

THE EFFECT OF LYSINE IN ANÆMIA.

HÆMOGLOBIN, the most important pigment in our human world, is still something of a mystery. Iron, thyroxin, vitamin C, Castle's extrinsic and intrinsic factors are all necessary for its synthesis; but a severe anaemia may exist in spite of an adequate supply of all these substances. Albert G. Hogan, Eugene L. Powell and Ralph E. Guerrant emphasize again the importance of suitable dietary protein in relation to recovery from anaemia.¹ These workers have shown in earlier papers that if rats receive deaminized casein as the only source of protein they survive for only a few weeks. When this protein component was reinforced with a mixture of gelatin and gliadin, the animals failed to grow, became anæmic and died. The same result was obtained when either wheat gluten, corn gluten or a laboratory preparation of lactalbumin was substituted for the gelatin-gliadin mixture. But if casein was included in the ration with deaminized casein, the rats grew rapidly and did not become anæmic, and this ration also cured animals in which anaemia had already developed. The authors believe that the anaemia is partly due to the presence of a toxic agent in deaminized casein and partly due to a deficiency of one or more amino-acids. Early attempts to identify the active agents by feeding pure amino-acids, singly or in combination, failed. The present paper describes experiments in which the addition of a comparatively large amount of lysine to the diet cured the anaemia produced by deaminized casein. The authors quote experiments by Müller, who demonstrated a reticulo-cyte response in pigeons injected with lysine, and they suggest that the role of lysine in erythropoiesis may prove to be of importance.

¹ *The Lancet*, April 26, 1941.

¹ *The Journal of Biological Chemistry*, January, 1941.

Abstracts from Medical Literature.

RADIOLOGY.

The X-Ray Diagnosis of Acute Intestinal Obstruction.

P. B. ASCROFT AND ERIC SAMUEL (*British Journal of Radiology*, January, 1941) state that the combination of distinct fluid levels and a corresponding degree of distension of the small or large bowel or both is, providing the clinical picture is compatible, proof of obstruction, and is seen in no other condition. If serious obstruction is present, it is readily diagnosed radiologically, and as certainly excluded if absent. When the bowel is obstructed the contents stagnate, absorption of water and gas diminishes, and an excessive amount of dilute secretion pours out. Fluid and gas then separate readily and fluid levels appear when the patient is in the erect position. In number they are proportional to the duration of obstruction and to its lowness in the small bowel. The authors have counted the fluid levels in their cases and, to facilitate comparison, graded them as follows: one to three levels, grade 1; four to eight, grade 2; eight to twelve, grade 3; more than twelve, grade 4. When the colon is obstructed, especially if it is short and has no sagging loops, there may be only one or two levels. But in most instances of large bowel obstruction the small bowel also is distended, sometimes to a degree overshadowing the colon. In cases of simple obstruction fluid levels appear in about four hours, and in obstruction with strangulation distinctly earlier. The lower the obstruction in the small bowel, the sooner levels appear. False fluid levels may be seen in the colon and perhaps in the terminal part of the ileum, when a watery enema is forced high and not completely expelled. For this reason X-ray studies should be made before an enema is given. The typical cross-riated pattern of the distended jejunum is well known. Towards the lower end of the small bowel the *valvulae conniventes*, to which the pattern is due, are smaller and fewer, and when the bowel is distended, may be obliterated, so that no pattern is visible. Such a patternless loop is apt to be confused with a loop of pelvic colon which does not always conform to the typical appearance of the rest of the large bowel. If such a loop is colonic, its continuity with the rest of the colonic shadow may be traced. Gas-filled loops of colon are easily recognized. The haustrations are characteristic and impart a wavy outline to the shadow. From the troughs of the waves transverse lines cross the colon, but at irregular intervals, and seldom completely, so differing from the more symmetrical arrangement in the upper part of the small bowel. The pelvic colon when distended often loses these special features, and appears as a smooth-walled tube without pattern, resembling distended ileum. Further, the pelvic colon does not always distend as much as might be expected, unless it is in a state of volvulus. This feature is still more distinct in the descending colon, which appears to be capable of only moderate ballooning. Consequently, the location of the site of obstruction in the colon is some-

times difficult and there is a tendency to choose a point too high. There is also a tendency to diagnose obstruction radiologically when none is present. When X-ray signs are equivocal there is no urgent obstruction. In these cases further films taken at intervals will clinch the diagnosis for or against obstruction.

Aneurysm of the Splenic Artery.

J. V. SEIDS AND HARRY HAUSER (*American Journal of Roentgenology*, February, 1941) state that when calcification is present in its walls, aneurysm of the splenic artery lends itself readily to diagnosis by X-ray examination. The calcium deposits form an oval or circular shadow of increased density in the upper segment of the left side of the abdomen. The periphery is usually sharply delineated, whereas the central portion of the mass presents a mottled appearance. Not infrequently the outer rim of the calcification may be interrupted in one or more places, as was noted in the author's two cases. The exact situation of the calcific deposit may be determined by gastro-intestinal studies with contrast material and by either excretion or retrograde urograms. The lesion occupies a position posterior or postero-medial to the *pars media* of the stomach, above the splenic flexure of the colon and superior to the upper pole of the left kidney. Calcified aneurysm of the renal artery simulates that of the splenic artery more closely than any other lesion. Pyelograms will disclose a pressure filling defect in the renal pelvis or near the hilum. Echinococcus cyst, with calcification in its walls, located in the mesentery, in the left lobe of the liver or in the spleen, may have the appearance of a calcified aneurysm of the splenic artery. Other lesions that appear as a calcified mass on the skiagram and require differentiation from aneurysm of the splenic artery include calcified cyst of the spleen, calcification in the cortex of a tuberculous kidney, perisplenitis, calcified mesenteric tuberculous lymph nodes, calcification in the walls of renal cysts, calcified blood clot, enteroliths and calcification in neoplasms.

X-Ray Diagnosis of Acute Bronchiolitis (Capillary Bronchitis) in Infants.

LESTER W. PAUL (*American Journal of Roentgenology*, January, 1941) reviews the clinical and pathological features of acute bronchiolitis in infants. The radiological findings consist of an extreme degree of bilateral obstructive emphysema simulating the changes seen in cases of ball-valve foreign body in the trachea. This is associated with or followed by the development of a diffuse miliary bronchopneumonia. The sudden onset of severe respiratory symptoms with paroxysmal attacks of coughing and choking are more suggestive of foreign body than of bronchiolitis. If the differentiation is in doubt, bronchoscopy should be performed. With the development of a miliary pneumonia the emphysematous appearance becomes much less noticeable, although it can still be seen on radiological study. At this stage confusion with miliary tuberculosis is possible. The lesions, however, lack the uniform size and distribution of those seen in miliary tuberculosis, being more profuse in the medial lung fields and basal portions. The importance of radio-

logical study in these cases is stressed since the emphysema is uniformly bilateral and it may be present in even a fairly marked degree and not be easily recognized on the film. The appearance may closely simulate that seen in a film taken at the height of extreme inspiration, as when an infant is crying. The important feature is the absence of normal deflation of the lungs with expiration.

Craniofacial (Luckenschadel).

EDWARD C. VOGT AND GEORGE M. WYATT (*American Journal of Roentgenology*, February, 1941), in the course of approximately 6,000 consecutive skull examinations, have examined 120 patients suffering from meningocele by X rays, and of these 43% showed craniofacial. In the remaining group of over 5,000 patients without meningocele only two with craniofacial were found. Craniofacial was least frequent in the presence of the smaller meningoceles and most frequent in association with the thoracic meningoceles. Its incidence in cases of meningocele was unaffected otherwise by the size or location of the meningocele. The condition was found more frequently in association with myelomeningocele than with simple meningocele, and its occurrence must be regarded as an unfavourable prognostic sign.

Increasing Density of the Renal Shadow during Excretion Urography.

STANLEY NOWELL (*British Journal of Radiology*, April, 1941) reports three cases in which, during excretion urography, there occurred a progressive increase in the density of one kidney shadow. While the pelvis and calyces of the same kidney failed to be outlined in two of these cases, they were demonstrated in the third case, being visible on the film on which the increasing density was seen. In each case an attack of urinary colic was in progress or had recently occurred, and a ureteric calculus was found to be present on the affected side. The occurrence of this unilateral increase in density of a kidney shadow during excretion urography indicates that it is due to the presence of contrast medium in the uriniferous tubules. This hold-up of the contrast medium in the tubules results from an increase in the pressure of the urine in the renal pelvis during the acute phase of a ureteric obstruction. On the cessation of the acute phase the pelvis and calyces will be demonstrated by the dye during excretion urography. After one or more of such acute phases a hydronephrosis may occur and, conversely, an acute phase may occur in a case in which a hydronephrotic kidney has previously been present. This increasing density of a kidney shadow during the period of an examination by excretion urography has points of diagnostic value. In cases with a demonstrable ureteric stone the increasing density, if present, will indicate that the condition is in an acute phase. In cases with a non-opaque stone the presence of this increasing density of one kidney shadow, whether the pelvis and calyces are demonstrated or not, indicates conclusively the presence of an obstruction. In acute cases with right-sided abdominal pain, liable to be confused with acute appendicitis, the demonstration of the increasing density might give a clue to the diagnosis. For instance, a stone in the right ureter,

even if demonstrated by radiography, might not necessarily be the cause of the pain. However, if the kidney shadow was seen to be becoming increasingly denser, there would be strong evidence that ureteric obstruction was the cause of the pain. In cases of suspected non-functioning kidney this increasing density of one renal shadow should be looked for carefully and, if necessary, films taken up to two hours. If increasing density is present, it is a sign that the kidney is functioning.

Anterior and Posterior "Notch" Shadows Seen in Lateral Skiagrams of the Vertebrae of Infants.

GEORGE WAGONER and EUGENE PENDERGRASS (*American Journal of Roentgenology*, November, 1939) state that in lateral skiagrams of the vertebrae of infants there occur shadows which would seem to indicate the presence of a "notch" or indentation in both the anterior and posterior walls of the bodies. The posterior "notch" shadow results from the presence of an actual indentation in the posterior wall of the body. This indentation is present in all vertebrae and at all ages. The notch is the point of entrance and emergence of the posterior arteries and veins. The anterior "notch" shadow results from the presence in this area of a large sinusoidal space within the vertebra. Indentation or "notching" of the anterior wall of the vertebral body is not present.

Renal Tuberculosis.

HENRY K. TAYLOR (*American Journal of Roentgenology*, November, 1939) states that renal tuberculosis can and often does coexist with secondary pulmonary tuberculosis, but is not a complication of it. The tubercle bacilli are deposited in the kidneys during the phase of the primary infection. The fixation of the tubercle bacilli is part and parcel of the primary infection. A subsequent activation of the tubercle bacilli results in disease. The localization of the tubercle bacilli may occur in any portion of the kidney. The lesion in the kidney is recognized only when it deforms a portion of the renal sinus. Early recognition of the disease is possible only when localization of the tubercle bacillus occurs at the renal papilla. When the tubercle bacilli are localized elsewhere, the lesion cannot be recognized early. When there is no encroachment on the renal sinus, there is no X-ray evidence of disease. The X-ray evidence is not indicative of the size or extent of the lesion. The presence of small calcareous foci in the kidney may be due to the healed or end stage of a primary infection, and is no indication of disease in the urinary tract.

PHYSICAL THERAPY.

The Radiumhemmet Experience with Radiotherapy in Cancer of the Body of the Uterus.

J. HEYMAN, O. REUTERWALL and S. BENNER (*Acta Radiologica*, March, 1941) submit a review of the experience at the Radiumhemmet, Stockholm, in the radiological treatment of cancer of the uterine body, and they include a report on the clinical and histological grouping

adopted at that centre in the classification of uterine carcinoma. With a view to the exact classification of cases, fractional curettage has been made a routine procedure in the examination of cancer of the corpus uteri. By this method specimens are obtained separately from the lower part of the cervix, the fundus, the upper part of the cervix and the corpus. A special specimen holder is used to collect these. A detailed account is given of the Radiumhemmet present method of treatment, that is, the packing of the uterine cavity with a number of uniform irradiators. Each irradiator contains eight milligrammes of radium element; but four different sizes are used, the variation of diameter being achieved by a variation of the air space between the external wall of stainless steel and the inner wall of lead surrounding the radium. The suitable size of irradiator is chosen with reference to the width of the uterine cavity, the wider ones being used in the wider cavity. Physical experiments have been done to determine the required dose. The results of the treatment are estimated on a series of 402 patients observed for a period of five years. The method of packing was employed in all suitable cases for the first time in 1934. The result of radiotherapy, combined with hysterectomy in case of failure, is that 75% of the number of patients with clinically operable growths treated in 1934 were alive without evidence of disease five years after the beginning of treatment. The five-year result obtained in these cases is 20% to 30% higher than that obtained with the old technique. Radium treatment, combined with hysterectomy in case of failure, is recommended as the method of choice except in patients particularly well suited to surgery. Definite conclusions as to the suitability of primary radiological treatment in the last-mentioned category of patients are postponed until further experience is available.

Recovery Under X-Ray Treatment of Monkeys Poisoned by Carbon Monoxide.

J. A. CAMERON (*Radiology*, April, 1941) published an account in 1939 of the differential recovery of rats poisoned by carbon monoxide when exposed to X rays. He has now extended this work to the primates, selected newly imported *Macaca rhesus* monkeys weighing from five to six pounds being used. The work was based on the idea that since illumination with strong visible light removes carbon monoxide inhibition in fish embryos, the stronger radiations of X rays might promote the recovery of larger more opaque animals. Pure carbon monoxide was prepared and stored, and the atmosphere of the gas chamber was adjusted to contain 12.5% carbon monoxide by volume in air. The animals were placed in identical wooden boxes and the test animal was placed under the tube of a "Victor" X-ray machine (Snook model) operated at 140 kilovolts. Nine experiments were begun, seven giving positive results; but in the other two the monkeys were over-gassed and died in the gas chamber before X rays could be applied. In three of the seven experiments the control animal had died by the time the test animal was removed from the X-ray compartment after an exposure of from five to six minutes. Each of the three surviving test animals was

active and vocal, making determined efforts to escape from the box. In the other four experiments sublethal exposures to the gas were made, and the same animal served once as a test animal and once as a control, with an interval of one week or more between the two parts of the experiment. In these cases the time required to reach various stages of recovery and to resume normal activity was reduced to one-half or one-third when X rays were employed. It is concluded that X-ray treatment in moderate amounts was a critical factor in the recovery of these animals.

The Relief of Symptoms in Raynaud's Disease by X-Ray Therapy.

A. S. ROTHERO (*American Journal of Roentgenology*, March, 1941) points out that most therapeutic agents are of little benefit in Reynaud's disease. Heat, warm socks, arsenic, thyroloid extract, atropine and many other agents have been suggested, but have not been successful. Operations on the sympathetic nervous system have been advised as the best method of treatment and have been considered curative in the uncomplicated cases. X-ray therapy has also been tried by some workers with indifferent results. The author gives details of the case of a woman, aged forty-one years, whose characteristic symptoms and signs were noted during four successive winters. Initial employment of the ordinary therapeutic measures failed to result in improvement. Subsequently irradiation with X rays at moderate voltage and in moderate doses to the cervical and lumbar regions gave considerable symptomatic relief for two consecutive winters.

Radiation Treatment of Plantar Warts.

JOSEPH H. MARKS and CLIFFORD C. FRAUSEN (*The New England Journal of Medicine*, November 21, 1940) report the result of radiation treatment of plantar warts in a series of patients, of whom 158 received primary treatment by radium and 15 received primary treatment by irradiation. The authors advocate the use of single large doses of either X rays or radium over an area not exceeding 1.0 centimetre in diameter, and recommend that the dose should not be repeated. With radium their method is to screen the wart closely and to use up to 16 millicurie-hours of radon filtered through 0.3 millimetre of steel, the applicators being applied to the surface of the foot after the callus overlying the wart has been pared away. When using X rays they employ single doses of from 1,200 to 1,800 r, according to the site and size of the lesion; but larger doses are used when the wart is situated in the tougher tissues of the ball of the foot than when the involved area is in the softer tissues beneath the longitudinal arch or on the toes, and the radiations are generated at 200 kilovolts and filtered through 0.25 millimetre of copper and 2.0 millimetres of aluminium. The authors have made a follow-up study of their patients for nine years; they emphasize that radiation treatment for this condition should be repeated only with the greatest circumspection when the single massive-dose method has been used, irrespective of the interval between treatments. In all cases in which irradiation failed, electrodesiccation succeeded in eradicating the wart, and the authors treat all plantar warts by electrodesiccation

if a single massive treatment of X rays or radium has been given and has failed. Multiple warts on the hands have been treated with good results by means of small doses of X rays of about 300 r each, and for children doses of 100 r repeated at intervals of one week. The authors state that it is unnecessary to shield the individual lesions closely if reasonable care is used to protect the uninvolved area; and more recently they have successfully applied this same method to plantar warts, in cases in which many lesions were present over a relatively large area.

Nævus Epithelioma Cyliodromatosus and its Radiological Treatment.

S. ERIKSSON (*Acta Radiologica*, March, 1941) describes eight cases of multiple *nævus epithelioma cyliodromatosus* and six cases of the solitary type, in all of which treatment has been carried out at the Radiumhemmet, Stockholm. In three cases the tissues showed definite transitions between the *nævus epithelioma cyliodromatosus* and *epithelioma adenoides cysticum*. In one case the microscopic picture suggested that a *nævus epithelioma cyliodromatosus* may have changed over to basal cell cancer. The familial occurrence of *nævus epithelioma cyliodromatosus* is stressed. In cases characterized by widespread tumours in which operative treatment is difficult or impossible, a good result has been obtained with radiotherapy. In two cases of the multiple type the patients were treated by the implantation of radium needles with a complete disappearance of practically all the lesions. In four cases of the solitary type, excision had been carried out at other hospitals, and radium implantation was done to avoid recurrence. In all these cases the treatment has been successful. Three patients with extensive tumours on the face and head have received X-ray treatment. A tumour dose of 2,800 r was given. The histological picture has been found to be completely altered by radiation, pronounced hyalinization taking place.

MEDICINE.

The Treatment of Fibrositis with Vitamin E.

CHARLES LE ROY STEINBERG (*The American Journal of the Medical Sciences*, March, 1941) reports the result of treatment of fibrositis with vitamin E. The author defines fibrositis as an inflammatory reaction of fibrous connective tissue anywhere in the body, and he differentiates between primary and secondary fibrositis. Wheat germ oil was given in doses ranging from two to eight cubic centimetres daily to 82 patients, each dose being administered in milk at meal time three times a day. All of the patients had been observed for a period of three months to two years under different methods of therapy, so that their clinical status at the time of the beginning of vitamin E therapy was "stabilized". The group included 30 patients suffering from primary fibrositis, 20 suffering from fibrositis secondary to hypertrophic arthritis, one suffering from fibrositis secondary to gout, three suffering from sciatica and eight suffering from neurosis. The author states that all patients with primary fibrositis were completely

relieved of all symptoms, but that in some of the more severe cases the more concentrated preparation of vitamin E may be required to obtain a complete result. It was found that vitamin E is of little value in the treatment of secondary fibrositis, and the author suggests that the results of his studies tend to indicate that primary fibrositis may be a metabolic rather than an infective process.

Carbohydrate Metabolism and Vitamin B.

ABRAHAM TRASSOFF AND CHARLES BORDIN (*American Journal of Digestive Diseases and Nutrition*, January, 1941) refer to the work of Funk, Abderholden and Peters with regard to the relationship between carbohydrate metabolism and vitamin B. According to the latter workers, vitamin B₁ deficiency causes a progressive diminution in the carbohydrate tolerance of laboratory animals. However, after a careful analysis of 15 diabetic patients treated with vitamin B preparations over varying periods of time, the authors are not convinced that the improvement in the carbohydrate tolerance of five patients was due to the vitamin B therapy. They state that the improvement noted by others (Vorhaus, Williams, Waterman and Dienst) may be due only to treatment of an unrecognized subclinical avitaminosis, or may be due to the usual factors, such as removal of infection or increase in the carbohydrate ratio.

Gastro-Intestinal Symptoms in Cardiac Disease.

NATHAN FLAXMAN (*American Journal of Digestive Diseases and Nutrition*, January, 1941) has analysed the histories of 1,500 cardiac patients and found 10-6% with gastro-intestinal symptoms of varying kinds. Half of these 10-6% had gastro-intestinal manifestations before the symptoms of heart disease appeared. Only three patients had actual gastro-intestinal disease associated with cardiac disease. The gastro-intestinal symptoms noted in conjunction with heart disease were, in order of frequency, epigastric pain, abdominal distress or pain, right upper quadrant pain, vomiting, nausea, belching, diarrhoea, obstipation, flatulence, dysphagia, hiccup and hæmæstesis. These gastro-intestinal manifestations disappeared with the successful treatment of the cardiac disease.

The Use of Sulphathiazole in Pneumococcal Pneumonia.

VERNER B. CALLOMON AND WILLIAM E. GOODPASTER (*Annals of Internal Medicine*, December, 1940) discuss the use of sulphathiazole in the treatment of pneumococcal pneumonia. They review the experimental basis underlying the clinical use of sulphathiazole, and present a report of the results of its administration in the treatment of fifty cases of pneumococcal pneumonia. In all cases in the series there was radiographic evidence of consolidation, and either a positive blood culture was obtained or the pneumococcus was the predominating organism in the sputum; the ages of the patients varied from twenty to eighty-two years, and the general degree of severity of infection was equal to that usually encountered, as shown by the fact that in 32% of the cases positive blood culture was obtained at the beginning of treatment. The dosage employed was four grains initially, followed by one grain every

four hours, and the total dosage varied from 7 to 75 grains, with an average of 33 grains. Four deaths occurred in this series, a mortality rate of 8%. The authors observed no direct relation between the blood level of the drug and the clinical response, and toxic effects of the drug were inconspicuous, nausea and vomiting being rarely encountered and then being only mild and of short duration. Azotemia apparently related to the administration of sulphathiazole was observed in two instances, and the importance of adequate fluid administration in its prevention and correction is stressed by the authors. The general effect on the temperature curve and clinical course of the disease was found to be similar to that observed with sulphapyridine therapy.

Gastroscopy.

EDWARD B. BENEDICT (*The New England Journal of Medicine*, December 5, 1940) discusses the indications for gastroscopy and presents the clinical histories of twelve patients illustrating the advantages of this procedure. He states that gastroscopy with the flexible gastroscope has now become a generally accepted method of examining the stomach, as it gives information regarding the gastric mucosa unobtainable by any other method, particularly in regard to the colour and detail; but it supplements rather than displaces other methods of examination. The author describes his method of passing the gastroscope, without the aid of trained assistants, with the patient lying on the left side and the head supported on small pillows, the technique of local anesthesia being simplified by having the patient gargle with a 2% solution of pantocaine. The various indications for gastroscopy are outlined by the author. He refers to chronic gastritis as the commonest disease of the stomach, difficult of clinical diagnosis but easy with the aid of the gastroscope, and he states that patients with vague gastro-intestinal symptoms and normal X-ray findings should be submitted to gastroscopic examination. In cases of duodenal ulcer with hemorrhage, the gastroscope will sometimes show that the bleeding is not arising from the ulcer, but from the associated gastritis; and recognition of this is important if surgery is to be undertaken in order to plan an adequate operation. The author does not make a diagnosis of gastric neurosis until gastroscopic examination has eliminated organic disease of the stomach, as in many cases of gastro-intestinal complaints wherein the symptoms persist in the presence of normal or inconclusive X-ray findings, gastroscopy establishes a positive diagnosis of chronic gastritis or other organic lesion. Various problems arising in the diagnosis and treatment of peptic ulcer, including the presence of associated chronic gastritis, the progress of ulcer healing and the question of cancerous changes, may be solved by direct inspection of the gastric mucosa. The author states that the gastroscopist can make a diagnosis of benign ulcer if the margins are sharp and the base clear, whereas a diagnosis of cancer must be made if the ulcer margins are irregular and the base is dirty. Assistance may be rendered the surgeon by the gastroscopic examination of the extent and operability of a gastric tumour. In polyposis of the stomach, gastroscopy may differentiate

true polyp from enlarged mucosal folds or foreign bodies, and will demonstrate in the case of the former the broadness of base and ulceration of surface indicative of malignant degeneration. The author points out that there are definite limitations to gastroscopy, and that some few patients cannot be satisfactorily examined because of inability to extend the head, or obstruction of the oesophagus, or spasm of the stomach, or lack of cooperation. However, he maintains that in 99% of cases a satisfactory introduction of the gastroscope can be effected. The author believes that with increasing experience and with improvement in the instrument, such as the biopsy forceps recently described by Kennamore, gastroscopic examination is bound to play an increasingly important role in the diagnosis and treatment of gastric disease.

Cardiac Mural Thrombi as a Source of Emboli.

CURTIS F. JARVIN (*The American Journal of the Medical Sciences*, March, 1941) discusses the relative importance of mural thrombi in the heart as a source of emboli, and reports his findings in a series of 771 consecutive cases of heart disease in which post-mortem examinations were made to determine the occurrence of mural thrombi and infarction. He found that pulmonary infarction was almost three times as frequent when mural thrombi were present in the right side of the heart as when they were not. Infarcts of the brain, kidneys, spleen, intestines and extremities were more than twice as common when mural thrombi were present in the left side of the heart as in their absence. A similar relationship was found to exist in regard to hypertensive heart disease, coronary artery disease with or without myocardial infarction, and rheumatic heart disease, with one exception. In coronary artery disease without myocardial infarction, infarcts in the brain, kidneys, spleen, intestines and extremities were 1.7 times as frequent when mural thrombi were present in the left side of the heart as in their absence. The author states that his observations indicate that mural thrombi in the heart are a significant cause of embolic occlusion of arteries in both the lesser and greater circulations.

The Diagnosis of Subacute Endocarditis due to *Streptococcus Viridans*.

HENRY A. CHRISTIAN (*The Journal of the American Medical Association*, March 15, 1941) observes from the case histories of 150 consecutive patients admitted to hospital with subacute *Streptococcus viridans* endocarditis that the majority are received in hospital with an incorrect diagnosis; he outlines the features of the disease upon which an early diagnosis may be made. He found that the chief early symptoms of these 150 patients resulted from toxæmia and were of malaise and fever in 52.6% at onset and in 71.3% at onset and in the early days of the disease, joint or muscle pains in 42% at or near onset, and nausea or loss of appetite in 16% at onset and in the early days of the disease. The author states that if these symptoms appear in a patient known or found to have evidence of chronic valvular or congenital disease of the heart, and persist for more than one week without the appearance of evidence of other

definite disease, the probability that bacterial endocarditis is present is great; if in these patients embolic phenomena appear or a blood culture is obtained, a definite diagnosis of bacterial endocarditis should be made. In all cases characterized by these features chemotherapy should be adopted at once, for it is the author's belief that early adoption of chemotherapy makes a cure possible in these cases, provided *Streptococcus viridans* vegetations are not too large and are not organized at the time of initial treatment. Early diagnosis has become an important adjunct to successful treatment.

Apoplexy with Low Blood Pressure.

ARTHUR D. ECKER AND MOSES DEREN (*The American Journal of the Medical Sciences*, March, 1941) report three fatal cases of apoplexy apparently precipitated by low blood pressure. The patients were elderly males in whom there was a slow post-operative drop in systemic arterial blood pressure, ending in an apoplectic seizure marked by unconsciousness and progressive hemiplegia, with death following in one, ten and five days respectively after the stroke. Necropsy revealed widespread areas of partly hemorrhagic necrosis in the cerebral cortex with little involvement of the subjacent white matter. There were thrombi in neither the main arterial nor venous trunks, but some of the pial vessels lying over the centre of the necrotic areas of the cortex were occluded with thrombi consisting largely of fibrin and masses of platelets. The authors state that such post-operative complications are less common than transitory or non-fatal apoplectic insults, but that the mechanism involved may be similar; this may shed light on the pathogenesis of the common cerebro-vascular accidents, unassociated with operation, the onset of which usually is not related to great exertion or even mental excitement. In so far as the cases demonstrate the clinical onset of apoplectic seizures in elderly men coincident with a drop in blood pressure to low levels, the authors think that it may be worth while in such cases to treat not only the threatened state of shock, but also the possible beginning of thrombosis by administration of anticoagulants, such as heparin.

Coronary Artery Disease and Auricular Fibrillation.

J. C. BRILL AND WILLIAM A. MEISSNER (*Annals of Internal Medicine*, February, 1941) report upon the data obtained from autopsy examination of 400 patients in an attempt to evaluate the role of coronary artery disease in the ætiology of auricular fibrillation. They state that in the absence of congestive heart failure or acute coronary occlusion, coronary artery disease is not a cause of auricular fibrillation. Congestive heart failure involving the left side of the heart, irrespective of the underlying pathological lesion, tends to favour the development of auricular fibrillation, and it is suggested that stretching of the left auricle might be an important factor in this process. Coronary artery disease may indirectly be concerned in the genesis of auricular fibrillation by first inducing congestive failure. The authors offer this mechanism as a probable explanation of the frequent appearance of transient auricular fibrillation following an attack of acute coronary thrombosis, although this arrhythmia occurs very rarely in

angina pectoris of coronary origin prior to the onset of congestive failure. The subsequent appearance of auricular fibrillation in a case of congestive failure affords no additional information which might serve as an aid in determining the presence or the absence of coronary artery disease. The authors confirm the observations of others, from an analysis of 100 cases of *angina pectoris*, that auricular fibrillation is rare in *angina pectoris* of coronary origin except in the presence of congestive failure. The authors conclude from the study of their cases that hypertension, congestive heart failure and cardiac enlargement, rather than coronary sclerosis, may be the important factors in the genesis of auricular fibrillation.

Sulphapyridine Therapy.

ROBERT A. KILDUFFE (*The Journal of Laboratory and Clinical Medicine*, March, 1941) surveys the progress of the clinical aspects of sulphapyridine therapy. He states that though efficient chemotherapy for pneumonia seems in large measure to have been achieved, we are still largely at a loss for a satisfactory explanation for, or a definite understanding of, the mode of action of sulphapyridine upon the pneumococcus. The action of the drug upon the pneumococcus is not bactericidal, but apparently merely bacteriostatic, as shown by the fact that while the pneumococcus remains alive and propagates itself in the presence of sulphapyridine, there is a definite lag in its growth which appears to be inhibited. The author discusses the "specific soluble carbohydrate substance" of the capsule, which is now held to be the most important constituent of the pneumococcus; he postulates some effect of the drug upon the capsule, in consequence of the interference in the presence of sulphapyridine with the Quellung reaction produced by the Neufeld typing technique. Reference is made to the various toxic manifestations encountered with the clinical use of the drug with emphasis on those resulting from depression of the hematopoietic system which the author declares to be the most important and most dangerous. The author states that sulphapyridine therapy is still largely in the stage of clinical experimentation, and therefore still in a state of flux, and that it is unfortunate in several respects that its clinical use has far outstripped the careful and controlled laboratory study of the drug and its derivatives. He suggests that it is desirable and in some respects essential in the use of sulphapyridine in pneumonia, to type the sputum before drug administration in every case, to perform a blood count before and repeatedly during the course of treatment and also for some days after the cessation of treatment, to examine the urine repeatedly during the illness, and to attempt to produce a blood culture before treatment is begun whenever possible. While there is uncertainty concerning the clinical importance of determinations of the blood concentration levels during the course of sulphapyridine therapy, whenever possible these should be done as routine procedures at regular intervals to discover their ultimate clinical significance and value. The author adds that it is well to mix sulphapyridine therapy with a generous measure of the ingredient recommended by Whistler for use on the palette of the artist, namely, brains.

Special Abstract.

PUBLIC HEALTH IN CANADA.

THE Canadian Public Health Association has issued a review of the history and organization of public health in Canada.¹ The book consists of a preface, a series of ten articles on the development of public health in the provinces, each by a different author, a section dealing with the work of the Department of Pensions and National Health of Canada, and an appendix in which are set out the expenditures by provincial governments in Canada in 1937 and those of the National Health Section of the Department of Pensions and National Health during the period 1939-1940. (These articles appeared from time to time in the *Canadian Public Health Journal*.) While the historical portion of the review is of much interest, the most important section from our point of view is the third, which deals with national health activities as they concern the whole of Canada, as distinct from those of the various provincial authorities. This section has been written by R. E. Wodehouse and J. J. Heagerty. In a brief résumé of the development of national health control in Canada, the authors state that as the result of pressure extending back to the days of confederation, the Department of Health was established in 1919 and later combined with the Department of Soldiers' Civil Re-Establishment to form the Department of Pensions and National Health as it exists at present. The National Health Section of this department has twofold activities, international and national. With regard to the former, as a signatory to the International Convention at Paris, which deals with quarantine regulations and procedures, the Health Section carries out the provisions of the convention which apply to all countries that signed it. The section early became a member of the *Office International d'Hygiène publique*, which meets twice a year at Paris and the object of which is to collect and disseminate information in regard to infectious diseases. Other activities of the National Health Section include the following: membership of associations such as the International Union against Cancer and that against venereal diseases, and participation in the International Agreement of Brussels to provide treatment for seamen suffering from venereal diseases; through the Laboratory of Hygiene the custody and distribution of biological and vitamin standards for the League of Nations; through a representative of the Health Section, who is also a member of the Opium Advisory Committee of the League of Nations, the informing of that body of the steps taken in the controlling of importation, manufacture and sale of narcotic drugs in Canada; through an understanding with the United States Public Health Service, the supervision of export to that country of shellfish and of water supplies on vessels plying in the Great Lakes and on common carriers in international service. Under the International Joint Commission both Canada and the United States of America investigate the pollution of boundary waters and act as the commission may determine in that regard. A National Council on Nutrition has recently been established, in accordance with the recommendations of the Health Section of the League of Nations.

The national responsibilities of the National Health Section of the department include the administration of the *Food and Drugs Act* and its regulations. This covers also the control of proprietary or patent medicines manufactured and sold both under the *Food and Drugs Act* and under the *Proprietary or Patent Medicine Act*. The section's medical officers, stationed in Europe and in Canada, act as medical advisers to the Department of Immigration, with the object of preventing the entry into Canada of physically defective immigrants. All vessels entering Canadian ports are subject to quarantine control, and provision is made at the various ports for the treatment of sick mariners. Assistance is given by the section to the provinces, by way of grants, provision of personnel or cooperation, in the carrying out of special pieces of research in public health fields which are primarily provincial in character and yet have what Wodehouse and Heagerty describe as "Dominion repercussion".

Four new divisions have been recently established within the section: Maternal and Child Hygiene, Industrial Hygiene, Epidemiology, and Publicity and Health Education.

The Dominion Council of Health meets twice a year at Ottawa to consider matters submitted by members; the

members are the Deputy Minister of Pensions and National Health (chairman), the chief medical officer of health of each province, one scientific adviser, and four lay persons, representing respectively labour, agriculture, women's urban organizations and women's rural organizations. The provincial ministers of health once a year meet with the Federal Minister of Health to consider common public health problems. Wodehouse and Heagerty remark that these two sets of meetings have brought excellent results, and make the following statement:

As time advances, the relationship between the Dominion and the provinces is becoming closer and, as the Dominion has assumed some degree of responsibility for problems which though primarily provincial in character react nationally, the usefulness of the Department is becoming more apparent.

The Division of Quarantine, Immigration Medical and Sick Mariners' Services.

The work of the Division of Quarantine, Immigration Medical and Sick Mariners' Services is next reviewed. A description is given of what is actually done on the arrival of a passenger vessel from ports in the Orient with one or more patients suffering from smallpox among its passengers or crew. The *Canada Shipping Act* conforms with the International Sanitary Convention of 1926. The quarantine service, probably the oldest organized health activity under Dominion authority, attempts to provide the maximum amount of protection against the entry of disease and to cause the minimum amount of interference with shipping. The necessary information concerning infectious disease throughout the world is obtained from the *Office International* at Paris and from the Health Section of the League of Nations, which broadcasts this information from its eastern bureau at Singapore; it is picked up at Vancouver by the Department of Transport. A weekly bulletin is also obtained from the British Ministry at Whitehall, and special telegraphic advice is received in emergencies.

In 1906 all persons suffering from leprosy came under the care of the Dominion Government by an *Act Respecting Leprosy*. Two hospitals are maintained, at Bentinck Island on the coast of British Columbia, and at Tracadie in New Brunswick. At the end of March, 1938, there were 12 patients in all. The leprosy problem falls into two distinct parts: the first concerns the native-born who contract the disease in Canada, and the second the foreigner who brings the disease with him. Foci among the native-born have occurred in New Brunswick, Nova Scotia and Saskatchewan. Study of the spread of leprosy in Canada shows that it is due to the "family" type of intimate contact; the itinerant Oriental does not appear to have had much to do with it.

The Immigration Branch of the Department of Mines and Resources, by acting on the advice of medical officers of the immigration medical section of the Division of Quarantine, Immigration Medical and Sick Mariners' Services, is performing one of the most important public health tasks of the Dominion Government; it is refusing admission to Canada to immigrants who, owing to some mental or physical defect, would endanger the health of the citizens or might become public charges. The medical officers who give the advice consist of those on duty at the larger Canadian ports, two who are in London, and three who are on the Continent, and there is a roster of 570 local doctors throughout the British Isles. Prospective immigrants from Europe, with the exception of the Scandinavian countries, are examined before they sail; they are thus able to have a more careful examination and are saved the disappointment of breaking up their homes and then not being accepted.

Part V of the *Canada Shipping Act* provides for "such medical, surgical or other treatment as the case requires" for members of the crews of vessels that have paid sick mariners' dues. Dues of two cents per registered ton, not payable more than three times in one calendar year, must be paid by all vessels arriving from overseas in the ports of the five salt-water maritime provinces of Canada and by all vessels engaged in the interprovincial trade of these provinces. Fishing and government vessels may pay these dues if they wish.

The Food and Drugs Division.

A brief historical summary is next given of the development of the control of food and drugs, and the work of the Food and Drugs Division is discussed. The first *Adulteration Act* in Canada was passed in 1874; it covered only a few provinces. The act was revised and amended several times until in 1920 it was superseded by the *Food and Drugs Act*, the basis of existing legislation. This was limited in scope to the control of food and drink for man and drugs for man or animal. "Adulteration" was clearly distinguished

¹ Canadian Public Health Association: "The Development of Public Health in Canada; A Review of the History and Organization of Public Health in the Provinces of Canada, with an Outline of the Present Organization of the National Health Section of the Department of Pensions and National Health, Canada", 1940.

from "misbranding"; but misbranding provisions did not extend to drugs—they referred only to food. By this act "The British Pharmacopoeia" was placed as an authority in a more honoured position than it holds even in Great Britain. Definitions and standards prescribed by order-in-council under the act no longer had to be ratified by Parliament, but had the same force as if actually written into the act. Finally, the distribution of free samples of drugs from door to door or on the highway was prohibited. A serious omission in this act was the lack of any provision for dealing with misrepresentation with regard to drugs; the only fault that could be found with them was adulteration, and even that was limited to such drugs as had generally recognized standards of quality or potency. "Any one was at liberty to put any medicine on the market, so long as the medicinal ingredients were declared on the label, and recommend it in any decent terms for the treatment or cure of any or every disease, no matter how extravagant the claims." In 1927 the scope of the act was extended to cover misbranding of drugs just as it covered misbranding of foods. "Misbranding embraces the making of all false, misleading or exaggerated claims, by word, design or device, both directly and by inference."

Experience soon revealed that these provisions were not quite adequate to cope with the proprietary medicine business. Cases arose "in which it was found difficult to establish in the non-medical mind certain claims covering the use of medicines in certain serious ailments were exaggerated and false . . ." Thus in 1934 a new section 6A of the act was passed:

6A. No person shall import, offer for sale, or sell any remedy represented by label or by advertisement to the general public as a treatment for any of the diseases, disorders or abnormal physical states named or included in Schedule A to this Act or in any amendment to such Schedule. 1934, c.54, s.2.

Among the "diseases, disorders or abnormal physical states" are included arteriosclerosis, cancer, diabetes, goitre, heart disease, pneumonia and tuberculosis, "in the treatment of which self-medication by the layman is not considered the wisest course to follow".

In 1939 the act was again amended:

The meaning of the term "drug" was extended to include devices, certain domestic vermin destroyers, and cosmetics. Authority was given to make orders respecting the packaging and labelling of food and drug containers and regulation of the sale of potent drugs and of advertising of food and drugs. Power was also given to take proceedings in respect of misleading advertising. All of these provisions, however, have not yet come into force.

The food and drug administration of Canada handles over 60,000 samples per year and conducts laboratory examinations of nearly 25,000. It works entirely unobtrusively, because of its policy of dealing with things at their source. As Wodehouse and Heagerty remark: "Why let adulterated or misbranded goods filter through the channels of distribution and trouble the small shopkeeper with prosecution and annoyance over something in which he has really no blame, when the matter can be handled more satisfactorily, more efficiently and a great deal more expeditiously at the fountain head?" Shipments of food and drugs from abroad are inspected at the ports of entry. At Montreal, Toronto and Vancouver a special inspector devotes the greater part of time to this task. No inspector may, however, on his own responsibility refuse entry to goods; if he has cause for suspicion, he must submit samples to a Dominion analyst, who will pass judgement on them. The same type of procedure is adopted in the domestic market. If irregularities in labelling or defects in quality are brought to light, all the retailer is asked to do is to reveal where he purchased the product; the manufacturer is then asked to correct what is wrong, or if it is judged necessary he is prosecuted. "Inspectors are constantly travelling from point to point in their respective districts, inspecting detail stores and other markets and keeping a watchful eye on any irregularities. Where misbranding or adulteration is found, sometimes the whole market is surveyed."

Owing to the development of the chain store the standard of quality has improved, since fewer goods are sold "loose" than formerly; they are now as a rule packed in a central warehouse under better conditions than could be expected in the average retail establishment. In some respects, however, repeated surveys continue to be necessary, year after year.

Thus no amount of warning seems to be successful in impressing upon some butchers the undesirability of adding sulphite to sausage meat and hamburger steak to retard putrefaction or artificial colouring to make the

product look better than it really is. Someone has wisely remarked that the people of Canada should not be asked to eat embalmed meat . . . The soft-drink manufacturer requires a good deal of attention from the food and drug inspector. In this case the besetting sin is to use saccharine instead of sugar as a sweetening agent because it is cheaper and the product is not so liable to fermentation. The accidental incorporation of fluorides (cockroach poison) in baking powder, the use of non-permitted dyes in confectionery, the presence of excess water in butter and cheese, and the use of commercial acetic acid in the blending of vinegars might be mentioned as outstanding problems in the daily round of the laboratories.

Owing to the increasing attention that has been paid in recent years to drugs and medicines, the standards of pharmacopoeial preparations have improved considerably. Year by year one preparation after another is made the subject of a special survey, and a warning is given to manufacturers of defective products. Since 1927, by virtue of extra powers granted by amendments to the act, the work has been extended. New problems have had to be dealt with in addition to the old ones; these centre round the prepared or proprietary medicine. "The review of labels, circulars, newspaper advertising and radio broadcasts form a part of the daily routine in a sincere effort to protect the ailing public from exploitation. This work is being appreciated even by those who have to discard labels and advertising matter and write new ones. Indeed, it is now a common practice to submit label and advertising copy to the Department for opinion before going ahead with printing."

The laboratories also cooperate with other government departments in the carrying out of analyses. Material analysed includes: narcotics, counterfeit coin and liquor, submitted by the Royal Canadian Mounted Police; butter, cheese and fruit, submitted by the Department of Agriculture; insecticides submitted by the Department of National Defence; medicines submitted by the Division of Indian Affairs; material purchased by the Pensions Division of the Department of Pensions and National Health.

Let the taxpayer should complain of the cost of all this service, Wodehouse and Heagerty point out that it amounts to less than one and one-third cents per head of population.

The Narcotic Division.

The Narcotic Division has two tasks: the supervision of the legal trade in narcotics and the control of the illicit traffic. Both have an international as well as a national aspect, the international aspect arising from Canada's narcotic treaty obligations and membership of the League of Nations. All narcotic drugs, on arrival at their port of entry into Canada, are passed by the Customs and then escorted to the vault of the wholesaler by the Royal Canadian Mounted Police. Physicians and druggists obtain their supplies from the wholesaler. The Narcotic Division has a staff employed solely in entering upon personal cards, kept for each physician, veterinary surgeon, dentist and retail druggist in the Dominion all the narcotics that they purchase. Before such a card is made out, the registrar has first to give in the name of the professional man concerned as holding a licence and being of good standing. Monthly reports are received, and when they show a sale to someone who has not been reported as eligible by his registrar, the culprit is at once sent a letter pointing out that he cannot legally buy narcotics until he has complied with the regulations. There are 37 registrars, and they all willingly report changes in their registers. With regard to physicians, if the personal purchase cards show that large quantities of narcotics are being regularly purchased or prescribed, even if the quantity is less than the one ounce per month that wholesalers may supply without special authority, a "tactful letter of enquiry" is sent. This procedure has uncovered many cases in which narcotics were being used illegally or unnecessarily.

At the time when the review was compiled it was calculated that there were approximately 4,000 drug addicts in Canada, as compared with 8,000 some ten years earlier. During the same period there has also been a change in the type of drugs taken. Cocaine has almost disappeared from the picture, morphine is still used to some extent, but heroin is the most frequently taken drug. However, it has been found that heroin sold in "the underworld" is about 80% adulterated; this fact has in many instances had much to do with abandonment of the habit or at least with "involuntary reduction of dosage". The position with regard to codeine is interesting:

Canada was one of the first countries to discover and emphasize the fact that codeine is decidedly a drug of addiction when taken in massive dosage, and some few years ago a large number of people, particularly on

the Pacific Coast, were addicted to this drug, 60 grains daily being a common dose. It was realized, however, that, should codeine be immediately rendered unavailable, as was possible by amendments to the Narcotic Act, there would in all probability be a pronounced switch to the barbiturates, which do not come within the orbit of narcotic legislation, and thus create a situation which might well involve or facilitate one which was even worse. The policy was adopted, therefore, of limiting retail drug store purchases to one ounce of codeine monthly, which, having regard to the increasing legitimate demands for that drug, would not leave much for an addict using 60 or 80 grains daily. At the same time Provincial governments were encouraged to so amend their Pharmacy Acts as to provide that not only codeine but the barbiturates as well should only be available to the public upon medical prescription.

A strange new form of drug addiction, almost unknown outside of Canada, is the habit of hypodermically injecting smoking-opium. Not only does severe addiction result, but quite often large abscesses form. The growing of marihuana or cannabis (hemp) has also had to be made illegal.

The Proprietary or Patent Medicine Division.

The activities of the Proprietary or Patent Medicine Division are the next to be discussed. "The Canadian public spends millions annually for prepared medicines, which comprise varieties or brands of liniments, lotions, ointments, pills, powders, syrups, tablets, tonics, etc., of domestic and foreign manufacture, of which over 5,000 are sold in Canada subject to the Proprietary or Patent Medicine Act." The act first came into force in 1909 and was amended in 1919. It provides for the registration of all secret formulae and of all non-pharmacopoeial medicinal preparations, to be used by man internally or externally, and manufactured in or imported into Canada. The applicant for registration must give the formula and name of the medicine which he intends to produce or sell, and the name and address of the manufacturer, which are to be printed on the labels and wrappers; he also has to give an outline of the recommendations that are to be made for the article. The various representations that the manufacturer intends to make are carefully considered by a competent medical authority; if the claims are considered extravagant, false or misleading, registration is refused or the applicant is required to make the necessary modifications or deletions.

If any registered medicine is to contain any potent drug named in the schedule of this law, the manufacturer, under affidavit, must limit the dosage of the drug or drugs to quantities that an advisory board considers reasonably safe. The name and quantity per maximum dose of each scheduled drug that is present in a medicine has also to be printed on the labels and wrappers. The advisory board, which consists of men fully qualified in therapeutics, pharmacology, pharmacy and chemistry, has also to consider the recommendations for the adding or removing of drugs from the schedule, and "to decide what shall be deemed sufficient medication of medicines which contain alcohol in excess of 2½ per cent. by volume so as to unfit them for use as alcoholic beverages". The majority of medicinal preparations sold in Canada are for simple ailments, have an established demand, and are suitable for the purposes for which they are recommended.

The question of advertising has also received attention. Sections 8 (e) and 8 (f) of the act restrict what may be stated in advertisements on labels and wrappers, in literature and in radio broadcasts. The Proprietary or Patent Medicine Division assists manufacturers in preparing labels, wrappers, advertising copy and announcements to be broadcast, so as to avoid exaggeration and misrepresentation. Sometimes this censorship is resented; but the "reliable manufacturer" does not object to the control of his business—a control that is necessary for the health of the public—and is cooperative. Manufacturing chemists, when valuable discoveries are made in their laboratories, generally wish to keep these formulae secret, and so sell their preparations under the provisions of the act. Sometimes, however, these products are sold exempt from the provisions of the act with the formula printed on the labels.

The technicians of the department investigate new drugs, new combinations of drugs and new discoveries concerning the action and uses of old drugs. They decide what products may be safely used, and prescribe restrictions when they appear necessary. The "annual licence system" provided under section 6 gives the power to review and reconsider the registration of any medicinal preparation in the light of these new discoveries.

Registration under the act carries with it no approval of the article registered, and the number that it receives is for identification purposes alone. But a medicine manufactured

according to the conditions of registration may be held to be useful for the purposes for which it is sold. Medicinal preparations for the treatment of grave diseases or of conditions that require treatment under skilled supervision are refused registration. A periodical survey of registered articles is made and samples collected are analysed, for the purpose of ascertaining whether excessive quantities of potent drugs or alcohol are being used, and whether the terms of registration are being complied with. Inspectors throughout the Dominion report irregularities in the claims made for proprietary medicines in the various advertising media. Uninvited and indiscriminate distribution of samples from door to door is prohibited. The medical laws of the various provinces provide for the prosecution of unqualified persons practising medicine, and the fact that in such practice a proprietary medicine is prescribed does not save the offender from punishment. Each registrant under the *Proprietary or Patent Medicine Act* receives a licence, on which a notice is printed warning him that the licence does not authorize him to do anything prohibited by law.

Wodehouse and Heagerty point out that the act permits the sale of prepared medicines under conditions which not only are acceptable to the manufacturer, but also provide considerable protection to the public.

The Laboratory of Hygiene.

The Laboratory of Hygiene was established in 1919 for public health and research work. It has developed in two directions: (i) it makes studies of public health problems that are most appropriately dealt with by a central authority, and (ii) it controls the products mentioned in Schedule B of the *Food and Drugs Act* of 1927. The control of these products involves the devising and the checking of methods of assay and the provision of standards when possible. The schedule is in four parts, as follows: Part I covers preparations of strophanthus, digitalis and ergot and any other vegetable preparations for which biological tests are considered necessary; Part II covers preparations of pituitrin, thyroid extract, adrenaline, and any other products of animal tissues; Part III deals with sera and viruses, and with toxins, vaccines and similar biological preparations; Part IV covers organic compounds of arsenic and similar preparations for parenteral medication. With regard to the four parts of the schedule, the regulations control these products as follows: Parts I and II, standards of potency, labelling and methods of assay; Part III, and some products mentioned in Part II, standards of potency, labelling, methods of testing and all aspects of the methods of manufacture; Part IV, safety and labelling of the products. In addition, a licence is required to manufacture all the products in Part III and some of those in Part II before they may be sold in Canada. The Laboratory of Hygiene has to do with other provisions of the *Food and Drugs Act* dealing with the following: the potency and labelling of vitamin preparations; the quality of foods as indicated by bacterial content; the sterility, potency and safety of products for parenteral administration that are not mentioned or described in the regulations; the bacterial content and purity of preparations made from cultures of microorganisms; the phenol coefficients of coal tar disinfectants.

A licence to manufacture biological products is issued only when the department is satisfied that the manufacturer has provided all the equipment, accommodation and trained personnel necessary to produce an efficient product. Most of these establishments in Canada are regularly inspected and their records of production, distribution, technical methods and qualifications of personnel are examined. Samples of the products sold are examined at the laboratory.

From time to time methods of testing are reexamined. Bacteriological problems arising out of the *Food and Drugs Act* are dealt with by the bacteriological branch of the laboratory. The pharmacological branch deals primarily with the establishment of standards for certain of the drugs and hormones covered in Parts I, II and IV of Schedule B of the *Food and Drugs Act*, as well as standards for vitamins and other products of therapeutic value and with control of their toxicity or potency. In some instances, when the current methods of assay have been found unsatisfactory, the laboratory has improved them or developed new ones; some of these methods have been adopted by other countries.

Public Health Engineering.

The Public Health Engineering Division of the Department of Pensions and National Health "does not meddle with medicine or surgery"; it is concerned with such matters as the following: safe water supplies, municipal sewerage and sewage disposal; disposal of garbage and waste products; street cleaning; "shellfish sanitation"; control of nuisances; all means of promoting domestic and personal cleanliness;

swimming pool sanitation. It also has to do with the supervision of drinking water and ice supplies for use aboard common carriers, including passenger trains, and with regard to passenger trains it also supervises dining car sanitation, including the kitchens and places where food is stored and prepared. For the efficient accomplishment of this work a headquarters is maintained in Ottawa and the Dominion is divided into five public health districts.

The Medical Investigation Division.

The Medical Investigation Division of the department has two branches, one occupied with the supervision of illness in the Canadian Civil Service, and the other carrying out studies on various medical subjects in order to provide the department, and often the medical profession, with "necessary or new information not always available".

The supervision of illness in the Civil Service goes back many years to the time when officials of the Health Department were asked for an opinion as to what action might be taken on certain problem cases, both mental and physical, occurring in various departments of the Government. The application of medical knowledge to these problems proved to be so successful and so helpful to the lay persons handling staff matters that in 1934 a Branch was established in the Department of Pensions and National Health to scrutinize and advise on all medical certificates submitted for illness in respect to the conditions suffered and the length of sick leave warranted for such conditions. This Branch also investigates long-term illnesses and advises the departments concerned as to the probability of the individual again being able to carry out the duties of his position.

Of the 35,000 civil servants in all parts of Canada covered by this division, more than 11,000 are employed in the Post Office Department alone, and of these 5,000 are letter carriers and mail porters, and so are liable to accidents and subject to exposure. Other civil servants with outdoor occupations covered by this division are geologists and surveyors *et cetera*. The civil service thus constitutes a fair cross-section of the workers of Canada. At the end of 1934 a system of recording data on "punch cards" was introduced, and analyses of the information gained for the years 1935-1936 and 1937-1938, already published, have yielded interesting facts. As far as time lost from employment is concerned, it seems that the civil service compares favourably with the whole Canadian population. One-third of the total time lost as a result of illness was due to colds, *la grippe*, influenza and bronchitis. It appears from the figures that 26% of the working population are absent from work through illness for some period every year; 6% of these people have repeated illnesses and are away two or more times; they represent 43% of the total illnesses suffered. "This is a group that definitely requires more than the average amount of medical care, and among whom are many cases of functional nervous disease."

The realization of the value of this statistical study of morbidity in the civil service led to the investigation of some of the material in the departmental files, particularly that relating to war pensioners. The Medical Studies Branch of the division studied the causes of death of 16,000 war pensioners to the end of 1936, and as a result it was found that the expectation of life of pensioners, as compared with that of other men of similar age, was much greater than had been expected. This was the more strange since all the pensioners were suffering from physical defects or illness. The division helped the Canadian Rheumatic Association to conduct a survey on rheumatism and analysed the data obtained. At the time when the review was compiled the branch was investigating the records of all patients who contracted or were treated for syphilis during the last war.

Child and Maternal Hygiene.

The Division of Child and Maternal Hygiene is concerned with the following problems: those associated with maternal and infant welfare and mortality; "hospitalization of expectant mothers"; the character and distribution of medical and nursing services; the feeding and care of infants and pre-school children; crippled children, and those who need special care; welfare work for children not living in their own homes and for illegitimate children; early immunization against contagious and infectious diseases; the care of Indian and Eskimo children; juvenile delinquency; child labour; the medical inspection of schools and the mental health of children. A reduction in child and maternal morbidity and mortality is sought by means of the cooperation of the division with all official and voluntary agencies, education by means of lectures to the laity and to medical men and nurses, and the distribution of literature and the provision of guidance to all those engaged in the work.

The division is aided by the Scientific Advisory Committee on Maternal Welfare. This committee consists of a representative of the Canadian Medical Association, three representatives of university medical faculties and one specialist obstetrician; it meets when necessary in Ottawa and confers with the Committee on Maternal Welfare of the Dominion Council of Health. A similar committee on child hygiene has been formed to act in the same way. By means of statistical studies and questionnaires sent out, much information has been gained about the conditions under which obstetrical practice is carried out. For example, it is learned that the Chicago Maternity Centre has had notable success in reducing the maternal mortality rate; 21 maternal deaths occurred in 15,000 cases. "This is the result of concerted effort on the part of all services and organizations having to do with obstetrical care, and clearly demonstrates the great value of proper organization, education, and of adequate prenatal, intranatal and post-natal care."

The Division of Industrial Hygiene.

The Division of Industrial Hygiene was inaugurated in 1938 and is organized to undertake such tasks as the collection and dissemination of information concerning occupational diseases and health in industry, the supplying of consultant and research services to provincial departments or industries on specific problems, and the supplying of trained personnel to help provincial departments in the carrying out of "fact-finding" surveys to discover the extent of their problems, so that plans for action may be formulated.

The Division of Epidemiology.

The Division of Epidemiology is one of the more recently established divisions of the department. "Its purpose is to cooperate with the provincial, territorial and other health authorities and to assist in bringing about co-ordination of effort in the improvement of the health of Canadians." It undertakes the investigation of those matters which are more properly the task of a federal authority than of provincial health services. One of the diseases specifically mentioned is diphtheria.

A recent analysis of the morbidity from diphtheria shows that there has been a long-term rise in incidence, with a subsequent fall common to all of the provinces—the latter not necessarily attributable to the widespread use of toxoid. In recent years the tendency has been for the morbidity to rise again. Obviously the most important factor in the increase of diphtheria is the failure in many communities to conduct or to continue immunization against this disease. It may be that the public, having been assured rightly that diphtheria is preventable, has been lured into a false sense of security, or it may be that we, as health officers, look for a new field of conquest, not having consolidated our gains.

The incidence of scarlet fever also has risen, and although it is of mild type it presents a difficult problem. Work is also to be done on the problem of undulant fever as well as on that of the control of venereal diseases. A study of mussel poisoning is being made in Nova Scotia and New Brunswick. Dr. Karl Meyer, of the University of California, made the initial study of the subject and showed that the paralysis from which patients suffered followed the ingestion of certain mussels. After two deaths from this illness had occurred in Nova Scotia, the investigation was undertaken and a considerable amount of information was obtained. For example, it was found that poisoning followed the eating of certain kinds of mussels not previously found to be poisonous; the extended period for which mussels from these areas were found to be poisonous was also determined. Further surveys on the same subject are being conducted. In the same manner a study is being made of Rocky Mountain spotted fever and sylvatic plague in the provinces of Alberta and British Columbia. The division is also developing an "epidemiological intelligence service".

The Division of Publicity and Health Education.

The Division of Publicity and Health Education was established in 1938 and will take the lead in campaigns to enlighten the public on the subject of Canada's facilities for health preservation. It works in close collaboration with the provincial health authorities, whose work is in no wise interfered with. All methods of contact between health authority and private citizen are being used. The Canadian Press, a cooperative news-gathering organization, gives invaluable help, and assistance is received, not only from the Canadian Broadcasting Corporation, but also from privately controlled wireless transmitting stations. The division will use all means of carrying on its work of inspiring a greater interest in and attention to hygienic living.

British Medical Association News.

SCIENTIFIC.

A MEETING of the Western Australian Branch of the British Medical Association was held on October 16, 1940, at Perth.

Epidemics.

DR. R. GWYN WILLIAMS read a paper in which he discussed epidemics. He began with the statement that since the last war there had been great advances in the control of infectious diseases likely to occur in epidemic form. These advances were reflected not only in a reduction in the number of persons suffering from infectious disease, but also in a reduction in the mortality rate among individual diseases. The general improvement in public health administration, the adoption of proper methods of sewerage, the inspection and supervision of food supplies, the provision of pure water, steps taken to prevent overcrowding and the maintenance of hospitals, with medical attention for rich and poor, had enormously increased the defences against major outbreaks of serious infectious disease. During the Boer War more British soldiers died of typhoid fever than were killed by the enemy. In this connexion Dr. Williams instanced a legal action that had been brought within recent years against a local authority in Greater London. In this action the local authority was found to be liable to pay many thousands of pounds because it had been negligent in not preventing typhoid contamination of the water it supplied to ratepayers and their dependants. The epidemic was a small one; but its cause was ascertained exactly and the blame was sheeted home to the appropriate authority. Dr. Williams mentioned the incident to show a change in the attitude of the public generally. A typhoid fever epidemic was no longer an act of God; it was evidence of defective sanitation.

Dr. Williams went on to say that while the effect of improvement in public health administration had been steady and invaluable, advances in bacteriology had had more remarkable and dramatic results. There had been great advances in tests which led to early and exact diagnosis. This was particularly noticeable in typhus and in Brill's disease—a disease which, if not detected and countered in the early stages, was apt to play havoc with military forces. The wide application of measures to confer active immunity against diphtheria, typhoid fever and smallpox must have had great effect, not only in preventing epidemics of those diseases, but also in reducing the mortality rate among cases that chanced to occur.

Dr. Williams then said that smallpox was worthy of special mention, particularly from the point of view of Australians. As was well known, vaccination against smallpox was not in Australia vigorously carried out among all young children, and there must be a large percentage of people in this country who had never been vaccinated; yet for years the country had been almost completely free from smallpox. This was due to three main factors: (i) Almost all persons who arrived in Australia had been vaccinated. (ii) Persons who left Australia to travel overseas and return were vaccinated before their departure. (iii) The person who had contracted smallpox on the way to Australia had, by reason of the length of the voyage, developed symptoms which were likely to lead to his segregation under quarantine regulations. No small measure of debt was owed to the vigilance of the port medical officers. Passengers resented their early morning inspection in Gage Roads, and ridiculed the showing of hands and the baring of foreheads, the herding together of important people like sheep waiting for dipping; but what was the result? No smallpox. Dr. Williams thought that the time was opportune to press for more general vaccination of the young. War conditions were likely to lead to relaxation of vaccination *et cetera* in Europe. Unvaccinated persons might therefore arrive in Australia after passing through countries in which smallpox was epidemic. They might arrive by air or by faster vessels than had been the custom; Dr. Williams had heard of one vessel that took less than four days from Colombo. Australian soldiers, whether serving abroad or at home, were protected in accordance with the following régime. On one day they were vaccinated and given 0.5 cubic centimetre of "T.A.B." vaccine and one cubic centimetre of tetanus toxoid. Three weeks later they received 0.5 cubic centimetre of "T.A.B." vaccine. At the end of another three weeks they received one cubic centimetre of "T.A.B." vaccine together with one cubic centimetre of tetanus toxoid. There did not appear at the present time any reason to protect the soldier against diphtheria. But Dr. Williams thought it was of great importance that war conditions should not lead to any

curtailment of diphtheria immunization amongst children. On the contrary, it should be pushed ahead with added keenness.

Dr. Williams then referred to an epidemic of rubella which had raged in Western Australia and in Australia generally for more than a year. Fortunately, while it had caused some disorganization in both civil and military life, it had not been serious, and it appeared to be on the wane. True measles, however, presented a much more serious problem. Measles had for months been epidemic in the civil population and in camps. It was often encountered in virulent form, and several deaths had occurred. It was not uncommon for severe bronchopneumonia to precede the appearance of the rash. Middle ear complications had also been common. The epidemic had clearly demonstrated the inadequacy of the hospital accommodation available for patients suffering from infectious diseases. If only a moderate epidemic of diphtheria or scarlet fever were to be encountered at this time the position would be serious. The measles had been so serious as to require proper hospital treatment of patients. Sufficient beds had not been available, even for civilians. Yet soldiers suffering from infectious disease were just as much a civil responsibility as a military responsibility. Dr. Williams said that he would deal with this aspect later. Had it not been for Dr. Muecke's foresight in pressing for the disused wards at "I.D.B.", the situation would have amounted to something like a public scandal.

Three points seemed to be of importance in the treatment of measles and in the limitation of an epidemic: (i) the provision of proper isolation hospital accommodation for seriously ill patients, (ii) the use of convalescent serum early in suitable cases, (iii) the isolation of susceptible persons during the period of greatest danger. This was particularly valuable on troopships, though no doubt the principle should be adapted to schools, colleges, factories *et cetera*. For example, on a troopship a census was taken of all soldiers who had had measles between 1924 and 1936; to these might be added those who were known to have had true measles since their enlistment. It was thus possible to compile a list of immune soldiers. If the numbers made it possible, the remainder, the susceptible people, were isolated from the eighth to the fourteenth day after the outbreak. The isolation for twenty-four hours of men with suspicious symptoms was considered advisable.

An epidemic of cerebro-spinal meningitis was greatly dreaded. Unfortunately a small epidemic was present in Western Australia at the present time; some soldiers and 23 civilians were or had been involved. The mode of spread of cerebro-spinal meningitis was obscure; but one aspect was receiving increasing attention. This was that the concept of a "carrier", as it was understood in diphtheria, typhoid fever or malaria, was no longer practical and was if anything misleading. It was all-important to avoid overcrowding and excessive fatigue, to maintain all persons in the highest state of resistance and to avoid close mixing of mature adults with young adults and children. From the military point of view there were several preventive measures, and Dr. Williams quoted amongst them the following remarks by Dr. F. M. Burnet:

I personally feel that attempts at controlling C.S.M. by "carrier" detection and isolation are completely impracticable. Glover's work in 1915-1917 is the only real basis for the attempt, and subsequent experience, particularly that of Dudley, does not confirm it. If it should be found that in some particular epidemic the number of carriers in the population was of the same order as the number of cases, then I think it would be worth while, but as far as I know there is no evidence that any of the current Australian prevalences show this state of affairs. If, as usual, there are *hundreds or thousands* of carriers to each case, I think it is complete waste of time to look for them.

As far as I know there is no way of telling a virulent from a non-virulent meningococcus. I can imagine particular circumstances: e.g., Merrill's Broadmeadow experience (an orphanage) where carrier studies would be invaluable, but not in a large army camp or in a normal civilian life.

From a civilian point of view, normal hygienic precautions against droplet infection should be stressed and constantly explained to the public. The habit of kissing and fondling young children should be discouraged while cerebro-spinal meningitis was about. Visits of civilians to camps in which cases had arisen should be prohibited or discouraged. A bright spot was the effectiveness of treatment. Granted early diagnosis and early and adequate treatment with sulphapyridine, the mortality rate should not exceed 5%.

Soon after their entry into camp, soldiers were subjected to inoculations and vaccinations—all important procedures. The effect, however, was to lower the resistance just when

the men needed most protection because of strange surroundings, harder work, contact with carriers of various conditions *et cetera*. If only a considerable proportion of these men could be given their inoculation and vaccination before they went into camp, Dr. Williams thought the incidence of epidemics in recruit depots would be greatly reduced. This was not an easy problem; but if, for example, men who were free were inoculated on Friday evening, they would have until Monday morning in their own homes to recover before going to work. This could be voluntary and would not be applicable to all; but it was a suggestion worthy of consideration.

While discussing inoculations, Dr. Williams referred briefly to technique. He said that one often heard of men collapsing just before or just after injections. Much of this was due to the creation of a faulty environment. The procedure could be carried out in an atmosphere of alarm; this was accentuated if blunt needles or rough methods were used. Dr. Williams had himself inoculated more than 500 men three times each, and none of them collapsed. He admitted that he took great care of his needles and that he maintained conversation with each man at the time of puncture. He thought that these measures might or might not have played a part. Dr. Williams had heard that some units obtained the assistance of V.A.D.'s to aid in the inoculations. He was afraid that he had regarded the procedure as "clissy" until recently, when he witnessed the system in operation. He was much impressed, and recommended the suggestions to medical officers faced with large numbers of men to inoculate or vaccinate.

Finally, with regard to a tendency on the part of some civil authorities and doctors to adopt a non-cooperative and even antagonistic attitude towards the services, Dr. Williams said that it appeared to him (he was perhaps wrong) that the sailor, soldier or airman was just as much entitled to hospital treatment if he suffered from some infectious disease, such as measles, as was the bricklayer or "bottle-oh". He had not ceased to be a citizen because he had enlisted. In Britain the civil hospitals took over the greater part of the care of the sick and injured soldiers, whether they were suffering from infectious diseases or not. It was realized that the services had one main duty, which was fighting, and that the combatant side rightly claimed priority. The civil population—not without self-sacrifice and inconvenience—took care of the sick *et cetera* so that the services were as little impeded as possible. Dr. Williams commended that attitude to those who were more inclined to try to get something from the services to assist them in their civil problem than to suffer privations and disabilities in order to allow the services to proceed unhindered with their major task.

Medical Societies.

THE MEDICAL SCIENCES CLUB OF SOUTH AUSTRALIA.

A MEETING of the Medical Sciences Club of South Australia was held at the University of Adelaide on April 4, 1941.

Acute Haemorrhagic Leucoencephalitis.

DR. E. WESTON HURST presented a paper on acute haemorrhagic leucoencephalitis. A paper on this subject by Dr. Hurst was published in THE MEDICAL JOURNAL OF AUSTRALIA of July 5, 1941.

Production of Benzo-pyrone in Plants.

MR. R. J. BEST gave an account of a fluorescent benzo-pyrone produced in certain plants as a result of virus activity (injury). Mr. Best reported that the fluorescent ring which surrounded the necrotic primary lesions produced by some viruses on certain plant leaves was due to the accumulation of a stable, water-soluble, organic compound. The substance had been isolated and obtained in the state of pure crystals, the yield being about a tenth of a milligramme per plant. As a result of qualitative and quantitative analysis the substance was shown to be 6-methoxy 7-hydroxy 1:2 benzo-pyrone. A search of the literature revealed that this substance has been previously described as a constituent, probably inert, of a pharmaceutical preparation (*Tinctura Gelsemii*) derived from *Gelsemium sempervirens*. As a member of the coumarin group it has a slight narcotic action.

Post-Graduate Work.

CLINICO-PATHOLOGICAL CONFERENCE.

THE New South Wales Post-Graduate Committee in Medicine announces that the next clinico-pathological conference arranged by the Post-Graduate Directors of Medicine, Surgery and Pathology will be held in the lecture hall at the Prince Henry Hospital, Little Bay, New South Wales, on Monday, July 28, 1941, at 4.30 o'clock p.m. The subjects will be: (1) Two cases for diagnosis and discussion: (a) an abdominal catastrophe, (b) multiple symptoms following gall-stones operation. (2) Lobectomy—two cases. A cordial invitation to be present at the meeting is extended to all medical practitioners.

A COURSE IN SYDNEY FOR PART I OF THE MASTER OF SURGERY DEGREE.

THE New South Wales Post-Graduate Committee in Medicine announces that applications to attend the course suitable for candidates for Part I of the examination for the degree of master of surgery, to be held between August 5 and November 14, must be lodged with the Secretary of the Post-Graduate Committee, at the Prince Henry Hospital, Little Bay, on or before July 29, 1941, as the course will take place only if a minimum number of six applications is received.

Naval, Military and Air Force.

APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 136, of July 10, 1941.

NAVAL FORCES OF THE COMMONWEALTH.

Permanent Naval Forces of the Commonwealth (Sea-Going Forces).

Appointment.—John McFarlane Wark is appointed Surgeon Lieutenant (D), for temporary service, dated 30th June, 1941.

Citizen Naval Forces of the Commonwealth.

Royal Australian Naval Reserve.

Appointment.—John Francis Rutter is appointed Surgeon Lieutenant, dated 6th June, 1941.

Extension of Appointment.—The appointment of Surgeon Lieutenant-Commander Donald Dunbar Coutts, D.S.O., is extended for a further period of one year from 29th April, 1941.

Royal Australian Naval Volunteer Reserve.

Appointment.—Clifford Gerhardt Semler is appointed Surgeon Lieutenant (on probation), dated 19th June, 1941.

AUSTRALIAN IMPERIAL FORCE.

Australian Army Medical Corps.

The notifications respecting Lieutenant-Colonel L. G. Male and Major K. C. Purnell, M.C., E.D., which appeared in Executive Minute No. 95/1941, promulgated in *Commonwealth Gazette* No. 108 of 5th June, 1941, are withdrawn.

AUSTRALIAN MILITARY FORCES.

AUSTRALIAN ARMY MEDICAL CORPS.

Northern Command.

First Military District.

Q184624 Honorary Major W. H. Smith is appointed from the Reserve of Officers (A.A.M.C.), and to be Captain (temporarily), and retains the Honorary rank of Major, 26th July, 1940 (in lieu of the notification respecting this officer which appeared in Executive Minute No. 93/1941, promulgated in *Commonwealth Gazette* No. 105 of 1941).

The notification respecting the appointment of Honorary Captain R. A. Spence which appeared in Executive Minute No. 198/1940, promulgated in *Commonwealth Gazette*, No. 213 of 1940, is cancelled.

The date of appointment of Q185035 Captain (provisionally) H. S. Walsh which appeared in Executive Minute No. 154/1940, promulgated in *Commonwealth Gazette*, No. 170 of 1940, is amended to read 17th October, 1939.

To be Honorary Captains.—John Hamilton Crawford, Allan Vernon Henry, Noel Lyster Hall, Alan Davison, Arthur Stanley Roe, Sydney James Rumbold, Alexander William Stark, James Arthur Lionel Atkinson, Vincent Thomas Joseph Lynch, Frederick Carl Bechtel, Harold Knight Denham and Karl Ferdinand Christian Brunnich, 3rd June, 1941.

Eighth Military District.

To be Captain (provisionally).—Robert Alan Spence, 11th September, 1940, and to be Major (temporarily), 20th May, 1941.

Eastern Command.

Second Military District.

Honorary Captain A. E. H. Salter is appointed from the Reserve of Officers (A.A.M.C.) and to be Captain (provisionally), 17th May, 1941.

Captain (provisionally) E. J. Hardcastle is retired, 6th April, 1941.

Major K. C. T. Rawle is appointed to command a Casualty Clearing Station, 19th March, 1941.

To be Captains (provisionally).—Walter Furneaux Burfitt, 23rd May, 1941, and Mary Nicholl Bertram, 28th May, 1941.

To be Honorary Captains.—Cecil Aubrey Finley, 10th May, 1941; Demetrios Varvaressos, 13th May, 1941; Edward William Spark, 23rd May, 1941; and Robert Smith Candlish, 28th May, 1941.

Captain H. G. Cummine is appointed from the Reserve of Officers (A.A.M.C.), 21st May, 1941.

The following officers are appointed from the Reserve of Officers (A.A.M.C.) on the dates stated and to be Captains (provisionally):—

Honorary Captains T. W. Miles, 31st May, 1941, J. N. Sevier, 3rd June, 1941, and R. C. Scoble, 10th June, 1941.

Honorary Major J. G. Hunter is appointed from the Reserve of Officers (A.A.M.C.), and to be Major (provisionally), 19th May, 1941.

The provisional appointment of Captain N. Rau is confirmed.

N99423 Honorary Captain E. B. Docker is appointed from the Reserve of Officers (A.A.M.C.) and to be Captain (provisionally), 1st November, 1940 (in lieu of the notification respecting this officer which appeared in Executive Minute No. 60/1941, promulgated in *Commonwealth Gazette*, No. 63 of 1941).

Honorary Captain G. H. Hair is appointed from the Reserve of Officers (A.A.M.C.), to be Captain (provisionally) and to be Major (temporarily), 29th January, 1941. (This cancels the notification respecting this officer which appeared in Executive Minute No. 55/1941 promulgated in *Commonwealth Gazette*, No. 55 of 1941.)

To be Honorary Captain.—Hugh Kingsley Ward, 26th May, 1941.

Southern Command.

Third Military District.

Honorary Captain D. A. Alexander is appointed from the Reserve of Officers (A.A.M.C.), 6th Military District, and to be Captain (provisionally), 31st May, 1941.

Honorary Captain D. O. Shiels is appointed from the Reserve of Officers (A.A.M.C.), to be Captain (provisionally), to be Major (temporarily), and is seconded, 16th May, 1941.

Major M. H. Maller, M.C., is appointed from the Reserve of Officers (A.A.M.C.), 31st May, 1941.

Honorary Captain H. J. B. Stephens is appointed from the Reserve of Officers (A.A.M.C.), and to be Captain (provisionally), 31st May, 1941.

To be Major (temporarily).—Captain (provisionally) V30304 J. G. Johnson, 31st May, 1941.

To be Captain (provisionally).—Horace Townsend Hayes, 31st May, 1941.

The resignation of Honorary Major K. A. McLean, M.C., of his commission is accepted, 20th May, 1941.

To be Honorary Captain.—Warwick McLean Smithers, 31st May, 1941.

Honorary Captain R. R. C. Hayes is appointed from the Reserve of Officers (A.A.M.C.), and to be Captain (provisionally), 23rd April, 1940.

The notification respecting the appointment of Honorary Captain Robert Wall which appeared in Executive Minute No. 235/1940, promulgated in *Commonwealth Gazette*, No. 1 of 1941, is amended to read 30th October, 1940.

To be Honorary Captain.—Eugene Sandner, 31st May, 1941.

Fourth Military District.

Colonel Sir C. T. C. de Crespigny, D.S.O., V.D., and Lieutenant-Colonel H. K. Fry, D.S.O., from the Reserve of

Officers (A.A.M.C.) are appointed to command General Hospitals, 13th February, 1941, and 28th February, 1941, respectively.

Lieutenant-Colonel R. L. Kenihan, M.C., from the Reserve of Officers (A.A.M.C.) is appointed to command a Casualty Clearing Station, 26th February, 1941.

To be Honorary Captain.—Leslie Margaret McLeay, 13th May, 1941.

Western Command.

Fifth Military District.

Honorary Captain N. Rose is appointed from the Reserve of Officers (A.A.M.C.), and to be Captain (provisionally), 31st May, 1941.

Honorary Captain R. H. Crisp is appointed from the Reserve of Officers and to be Captain (provisionally), 29th January, 1941, and to be Major (temporarily), 29th January, 1941.

Seventh Military District.

To be Major (temporarily).—Captain (provisionally) V. J. McGovern, 28th May, 1941.

Honorary Captain W. W. Ingram is appointed from the Reserve of Officers (A.A.M.C.) and is granted the temporary rank of Lieutenant-Colonel, 13th March, 1941.

Major N. W. Markwell is transferred from Australian Army Medical Corps, 1st Military District, 19th November, 1940.

Captain (provisionally) C. H. W. Lawes, Captain (provisionally) (Temporary Major) G. H. Hair and Captain (provisionally) D. W. H. Arnott are transferred from Australian Army Medical Corps, 2nd Military District, 19th November, 1940, 20th May, 1941, and 31st May, 1941, respectively.

Captain (provisionally) J. H. Coles is transferred from Australian Army Medical Corps, 2nd Military District, and to be Major (temporarily), 7th June, 1941.

To be Major (temporarily).—Captain (provisionally) D. W. H. Arnott, 31st May, 1941.

CASUALTIES.

ACCORDING to the casualty list received on July 17, 1941, Captain J. A. F. Flashman, A.A.M.C., of Potts Point, New South Wales, is reported missing.

Correspondence.

THE LATE GEORGE ADLINGTON SYME'S SERVICE IN EGYPT.

SIR: Dr. C. E. Jackson's statement is quite correct. Dr. E. S. Jackson was appointed to take charge of the measles and venereal disease camp. The difficulties were great. Drugs were ordered from England and had not arrived. Beds were for a time unobtainable until palm wood beds were manufactured ultimately in thousands.

In such a war, where the staff was insufficient and the material deficient in quantity it became a problem of improvisation, which Dr. Jackson, in common with all of us, had to face and managed to get through.

Yours, etc.,

JAMES W. BARRETT.

103-105, Collins Street,
Melbourne, C.I.
July 8, 1941.

VITAMINS AND IMMUNITY.

SIR: With increasing knowledge of colloidal chemistry we must look upon the various antitoxins, lysins, agglutinins *et cetera* of immunology as states of dispersion of the tissue colloids rather than as new substances generated within the body. These phenomena are probably chemical combinations from which result the characteristic and specific reactions of agglutination, precipitation, hemolysis, complement fixation and neutralization of toxin.

Long-continued lack of sufficient vitamin content in food coupled with the catalase quenchers encountered in our modern way of life—anaesthetics, petrol fumes, industrial gases *et cetera*, together with injuries to colloidal dispersion of the tissues, for example, by metals possessing high valency, starvation, exhaustion from cold and fatigue—all

tends to derange normal cell metabolism. The normal metabolism of sugars—the major source of cellular energy—is a typical example of cellular metabolism in general. One important trouble in this system may be reflected on the whole cellular life. The exact chemical function of certain vitamins in the metabolism of the body is now well known. So aneurin (B_3), which, when it is combined with phosphoric acid and thus constitutes the prosthetic group of carbonylase—the enzyme which breaks down pyruvic acid in the body, prevents and cures beriberi. Beriberi is then an intoxication by pyruvic acid. Vitamins B_2 and B_6 are prosthetic groups of enzymes which are also part of an oxidation-reduction system.

Loss of immunity and allergy are fundamentally intoxications by pyruvic acid, so evidence is given that vitamin B_3 is of benefit in acute anterior poliomyelitis. Why not a more pronounced effect? Why should any deaths result, and why should we have any cripples? Because the adsorption into the functional mechanism of the living cell of the toxic metabolites before mentioned constitutes a vicious cycle facilitating the entrance of the same or similar molecules and also increasing the responsiveness of the cells to their photochemical effects. The longer the material is adsorbed, the greater are these effects until finally this allergy period may express itself as inability to make use of the doses of vitamin given.

If, however, a vigorous oxidation mechanism is restored decisively by using the oxidation catalysts I have been using for more than two years, I feel certain, judging by my experience of other virus diseases—measles, influenza *et cetera*—that all will become enthusiastic followers of this mode of treatment, which aims at removing the fundamental biochemical basis of lost immunity in the patient and is not concerned only with the removal of symptoms.

Further, as the result of personal experience in the treatment of allergies of the nervous system, I feel confident, if vigorous oxidation catalysis is restored in those cases of infantile paralysis whose crippling is less than twelve months old, then full function and power of paralysed muscles can be restored. The addition of the normal oxidation chain carrier into the field removes the whole pathogenesis, (i) by reestablishing the normal, or more vigorous than normal, catalysis of oxidation of sugars, and (ii) by the destruction of toxic metabolites adsorbed into the colloidal surfaces of the functional mechanism in question.

Normal catalysis of oxidation is achieved in a selected group of muscle cells. Correct energy production—distribution in the muscle injected with ethylene disulphonate in high dilution leads simply to provision of the previously missing carrier catalyst in the cells immediately surrounding the site of injection. The carrier catalyst gradually spreads from this site, the recovery process being essentially the same in all instances, that is, a rhythmic cycle develops as the essential theme of the procedure. The virus infections uniformly respond most quickly so that in measles the temperature may moderate in one hour, be normal next day, and the patient feel well in two days. Rapid recovery in the infections depends upon high toxicity and the predominance of polymorphonuclears. The lymphocytic stage of infection demands more time and the macrophagic stage takes longest to recover.

The extreme efficacy of this mode of treatment warrants the sparing of no effort to bring it into general use. Since October, 1938, it has been used continuously in my practice for the treatment of (i) acute and chronic infections, (ii) allergic states affecting each and every cell system ranging from asthma to epilepsy, (iii) arrested or delayed developments of the various glands of internal secretion, (iv) endocrine gland dyscrasias involving the thyroid gland and the pancreas. A most interesting phenomenon repeatedly seen has been the gradual softening and final disappearance of benign tumours—neurofibromata, fibrolipomata, papillomata, adenofibromata of the breast and chronic interstitial mastitis. Old scars in existence for years gradually disappear as the foci of infection so walled off are destroyed by the acquisition of full natural immunity.

Incidentally a most important field for the use of this chemical method of resolving allergy and restoring natural immunity is apparent in the victims of bomb shock. Twenty-three Australian soldiers who had been involved in numerous air raids in London have been returned to Australia as bomb-shock cases. The tachycardia, tremor, giddiness, insomnia, exhaustion and mental depression, with, in more severe cases, paralysis of an arm or leg, deafness or blindness, all indicate allergic hyperactivity of some nerve centres, as shown by the tremor and excessively active reflexes. The symptoms enumerated cannot be interpreted as cerebellar activities which escape efficient cerebral control, because in similar cases I have observed in civil practice the recovery response has been too rapid for scar dissolution

or new nerve development. Many cases of so-called disseminated sclerosis fall into the same category and the prospects of recovery response depend entirely upon the length of time since the malign changes in the colloid of the neurones occurred. So the sooner treatment is instituted in the case of these bomb-shock victims, the better their chance of full recovery.

Yours, etc.,

A. J. FITZGERALD.

183, Macquarie Street,
Sydney,
June 25, 1941.

THE MEDICAL STUDENT AND PUBLIC HEALTH.

SIR: Your leading article of July 5 on the medical student and public health gets very close to the heart of the subject. Preventive medicine is mainly not a subject, but an attitude to all disease. For the most part we treat the sick man, don't trouble greatly why he became sick, and don't worry much about him when he is well. In that respect, as I have indicated in works of mine, military medical science is far superior to civil practice.

I estimated that in the army one-third of the medical officer's time was devoted to prevention, one-third to treatment, and one-third to the disposal of the men after recovery. This involves all kinds of activity, from organized games to pleasant physical culture and the provision of employment for the partially disabled. It certainly does involve the prevention of hundreds of thousands of cases of venereal disease. In civil life the general practitioner is the high priest of health, and I have urged with only partial success that periodical conferences should be called between public health officials and general practitioners so that a practical programme could be arranged; otherwise the really able memoranda issued by the public health officers are apt to fall on stony ground.

Yours, etc.,

JAMES W. BARRETT.

103-105, Collins Street,
Melbourne, C.I.,
July 9, 1941.

PUBLIC HEALTH—RATIONALIZED MODEL.

SIR: I frequently see the drivers of bakers' carts untying manure-covered wheel chains and handling the crusts of our loaves with filthy fingers, contaminated thereby. In America one obtains, by law, all bread delivery in simple paper containers.

Why are our health authorities so unimaginative and primitive in their powers of observation? No doubt ingestion of dirt is, like bovine tubercle bacilli in infancy, a system of semioxious inoculation and protection against more serious environmental perils. Nevertheless I look forward to the day when I can enjoy my crust without the gorge arising in my throat. Even war shortage of paper should not stand in the way of this hygienic reform.

Yours, etc.,

"CRUST LOVER."

Melbourne.
Undated.

Obituary.

BENJAMIN ROBERT ARCHER TAYLOR.

It is with regret that we announce the death on June 28, 1941, on the eve of his eighty-sixth birthday, of Dr. Benjamin Robert Archer Taylor at his residence, "Kandapola", Meckering, Western Australia. We are indebted to Dr. F. W. Carter for the following account of his career.

Dr. Archer Taylor was born on June 29, 1855, at Tottenham, Middlesex, England, and upon leaving school was entered at Lloyd's, London. He was still there when Viscount de Lenseps visited England after the opening of the Suez Canal in 1869; the visit left a deep impression on his mind, and he often related how the assembled company sprang as one man to its feet cheering wildly.

Finding the work at Lloyd's too slow for his vigorous spirit, he resigned his position and entered on the study of medicine as a student at Guy's Hospital. The four senior surgeons at Guy's in his day were Cooper-Foster, Tommy Bryant, Arthur Durham, and House. He acted as dresser

to Cooper-Foster, and related that on one occasion while he was at work Arthur Durham came in and stopped at the bed of the patient whom he was examining. Durham entered into conversation with Cooper-Foster and a discussion arose regarding Listerism, which had then come into vogue. Durham said with sarcastic humour: "These Listerites will soon be opening the peritoneum." Of the four senior surgeons, House was the only one who had adopted the teachings of Lister at that time; he was the junior of the four. Lister had been appointed Professor of Clinical Surgery at King's College, London, just a year before this, and his work had led to much controversy.

Dr. Archer Taylor qualified L.S.A. (London) in 1880 and M.R.C.S. (London) in 1881. His medical registration certificate was dated August 1, 1881, so that he was on the register just one month short of sixty years.

A few years after he qualified he bought a practice at Kendal, Westmoreland, where he remained for over twenty years; he was on the committee of the Westmoreland County Hospital and was also a magistrate for the Borough of Kendal.

An acute attack of rheumatic fever caused him to turn his thoughts to a warmer and dryer climate, and he applied for a practice at Broome, Western Australia. His application, however, came too late; but his eyes being turned towards Australia, it was only a matter of time when an opportunity presented itself. Sir Gerald Strickland, of Sizar Castle, Kendal, having been appointed Governor of Sizar Castle, Kendal, about that time—he was later Governor of Western Australia—reports reached Archer Taylor concerning the favourable climate there, and in 1909 he bought a practice at Swansea, East Coast, Tasmania, where after a short residence his health was completely restored. He returned to England and took a course at Moorfields Eye Hospital, London, coming back to Australia in 1913 and settling at Temora, New South Wales.

After the war he went to Ceylon and practised at Nuwara Eliya, but returned to Australia in 1921 and settled at Meckering, where he practised until his death, exactly twenty years later.

Dr. Archer Taylor belonged to the old school, and loyalty, honesty and decency were his watchwords. He had a whimsical sense of humour and his mind did not track along the usual ruts, so that, always open to new impressions, he was in the forefront of any community with which he was associated. He was an ardent optimist, a loyal and generous friend, and a practitioner of the kind that is honoured with the confidence and love of his patients. He was a keen cricketer and an enthusiastic golfer almost to the time of his death. He was married twice: first to Miss Emma Whitwell, of Kendal, and secondly to Miss F. R. Mace, of Cambria, Swansea, Tasmania. He left one son by his first marriage.

Dr. Archer Taylor was a member of the British Medical Association for over fifty years, and was the oldest member of the Western Australian Branch.

DANIEL PATRICK O'BRIEN.

We regret to announce the death of Dr. Daniel Patrick O'Brien, which occurred on July 18, 1941, at Rockhampton, Queensland.

CLARENCE PATRICK MISKLE.

We regret to announce the death of Dr. Clarence Patrick Miskle, which occurred on July 19, 1941, at Maryborough, Queensland.

ALBERT WILLIAM SHUGG.

We regret to announce the death of Dr. Albert William Shugg, which occurred on July 20, 1941, at Hobart, Tasmania.

MEDICAL WAR RELIEF FUND.

The following is a twelfth list of contributions to the Medical War Relief Fund established by the Federal Council of the British Medical Association in Australia for the relief of distressed medical practitioners in Great Britain.

Western Australia.

- £5 5s.: Dr. A. H. Gibson.
£2 2s.: Dr. K. R. Gay.
£1 1s.: Dr. W. H. Godby, Dr. M. Radcliffe-Taylor, Dr. E. Stang, Dr. L. R. Jury.
£1: Dr. K. Keely.

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

- Bear, Colin Leslie, M.B., B.S., 1940 (Univ. Sydney), 3, Gilliver Avenue, Vaucluse.
Benbow, Thomas Alexander Palmer, M.R.C.S., 1916 (England), L.R.C.P., 1916 (London), 115, Macleay Street, Potts Point.

Diary for the Month.

- JULY 31.—New South Wales Branch, B.M.A.: Branch.
JULY 31.—South Australian Branch, B.M.A.: Branch.
AUG. 1.—Queensland Branch, B.M.A.: Branch (Ordinary).
AUG. 5.—New South Wales Branch, B.M.A.: Organization and Science Committee.
AUG. 6.—Victorian Branch, B.M.A.: Branch.
AUG. 6.—Western Australian Branch, B.M.A.: Council.
AUG. 7.—South Australian Branch, B.M.A.: Council.
AUG. 8.—Queensland Branch, B.M.A.: Council.
AUG. 8.—Victorian Branch, B.M.A.: Legislation Subcommittee.
AUG. 12.—Tasmanian Branch, B.M.A.: Branch.
AUG. 12.—New South Wales Branch, B.M.A.: Executive and Finance Committee.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmalm United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phoenix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

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